SCANNED 29 of 144

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WESTERN AUSTRALIA

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COVER PICTURE
View of Perth from the Wishing Well in King's Park.

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Blasting

EXPLOSIVES AND THE FARMER

PART II—EXPLOSIVES ON THE FARM

By G. A. GREAVES, B.Sc., A.R.A.C.I., Explosives Branch, Mines Department

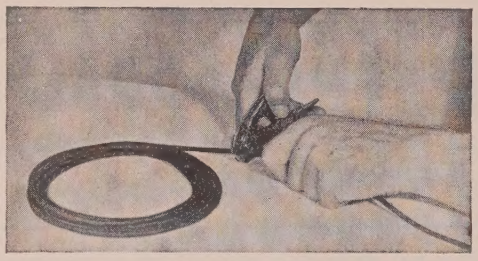
EXPLOSIVES will function with maximum reliability and efficiency only when they are carefully stored under cool, dry conditions so as to avoid deterioration. When preparing charges the user should follow a correct procedure and use the proper tools. Always treat explosives with respect and remember they are made to explode. When they hit they hit hard.

HINTS ON SAFE-KEEPING

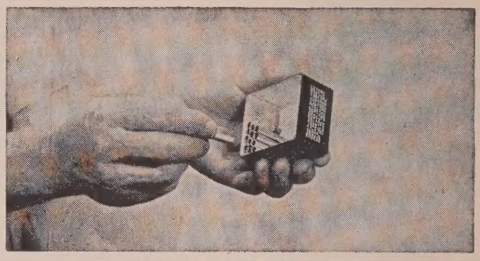
No storage license is required by a farmer for quantities less than 50 lb. or one case of gelignite, but he is responsible for keeping the explosive in a safe and proper manner. Purchases will usually be made from the nearest licensed store and should be limited to the amount required for the job in hand. It is far better to have fresh supplies than to rely on material which has been kept for months and which may be in doubtful condition. When explosives have to be kept on a farm there is no excuse for carelessness. Too frequently gelignite is left in an open box out in a shed where it may be forgotten and will soon deteriorate. Special care is necessary with detonators since they are small and seem to have some peculiar attraction for children who may insert nails or sticks into the open end. It is extremely dangerous to do this. The composition is sensitive to friction and explosion of a detonator when held in the hand causes serious injury which usually results in loss of one or more fingers and possibly the loss of an eye. Any loose detonators should be kept in a small box or tin with a clear label. This in turn should be enclosed in a small wooden receptacle box which is also clearly marked and kept in a safe and secure place. Detonators may also be kept in either a locked office drawer or a fireproof safe.

When plugs of explosive such as gelignite are kept and used on the farm it is essential that a wooden receptacle box be provided. The size will depend on the quantity of explosive but the box should have a close fitting lid, carrying handles and a padlock. A coat of white paint and the word "EXPLOSIVES" in red will ensure that the contents are known and treated with respect. Suitable receptacles and carrying boxes are frequently available from Army disposal stocks. Loose plugs of explosive should be placed in a tight-lidded tin or in a plastic bag within the box if they are to be kept for any length of time. This excludes moisture and prevents softening and deterioration. Detonators should not be carried in the same box with explosives unless separated from them by a thick partition to prevent possible communication in the event of an accident to the detonators.

It is a mistake to hide explosives in unusual places for security. Some unfortunate accidents have occurred for this reason. There was an instance some years ago in this State when a small quantity of gelignite was stowed in the oven of an old wood stove which had been removed from a house. In due course some other person put the stove back into the house



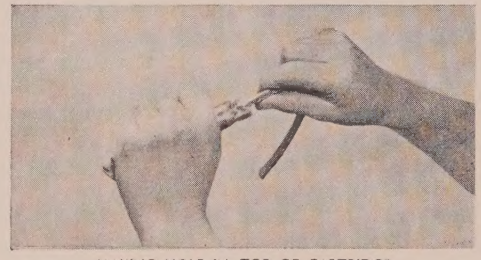
CUTTING THE FUSE



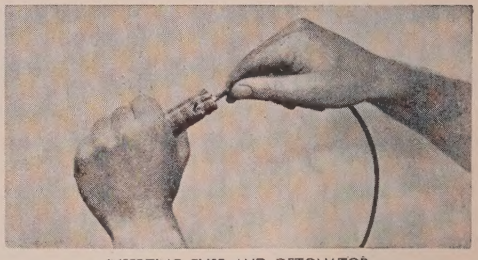
TAKING OUT THE DETONATOR

INSERTING THE FUSE INTO THE DETONATOR

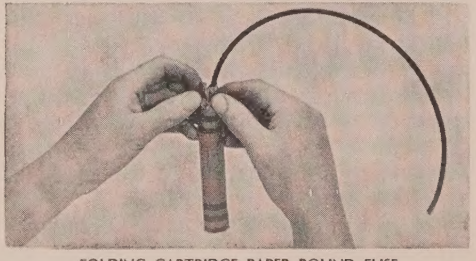
CRIMPING THE DETONATOR



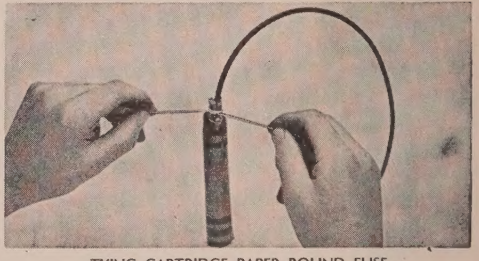
MAKING HOLE IN TOP OF CARTRIDGE



INSERTING FUSE AND DETONATOR



FOLDING CARTRIDGE PAPER ROUND FUSE



TYING CARTRIDGE PAPER ROUND FUSE

Procedure for capping fuse and making up priming charge

and lit a fire in it. When the oven became heated, a violent explosion occurred and three women were fatally injured. There may be some tendency on farms to use chaff or wheat bags for wrapping or carrying explosives. This can be dangerous since the bag affords little protection from moisture in the air. If the explosive is left to become wet or soggy the bag becomes impregnated with ammonium nitrate and is then a dangerous fire hazard since the fibre may then ignite spontaneously.

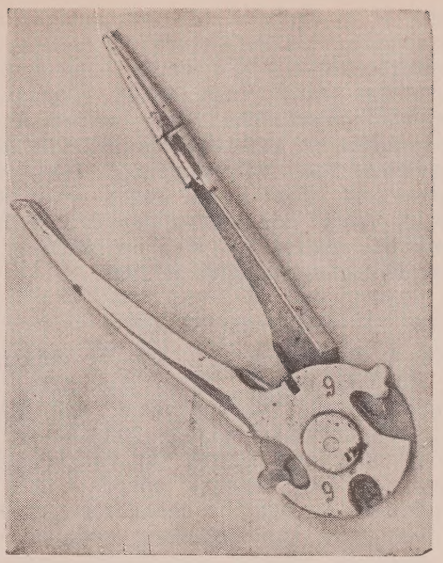
CAPPING A FUSE

This is the fitting of fuse to a detonator and the correct procedure is shown in the photographs. The tool used is called "crimping pliers" or "detonator nippers." They can be purchased for a few shillings through the licensed store and successful capping or crimping can only be achieved by having the proper tool made especially for the purpose. The tool also incorporates a cutter for safety fuse and a tapered end suitable for making the hole in a plug of explosive.

Length of fuse will depend on the size of the charge but should never be less than three feet. Fuse burns steadily at 90 seconds per yard and this gives ample time to walk to shelter when firing a small charge. Always cut the fuse squarely across and remove about half an inch from the free end as a precaution so as to expose fresh, dry powder. Remove a detonator from the tin and tap it gently on the thumb or into the palm of the hand to remove loose sawdust. Hold it to the light to make sure the inside is clear. Insert the fuse gently as far as it will go without using any force or screwing action, then crimp firmly and evenly with the crimping pliers.

MARKING THE PRIMER

This should be done when all else is ready for the blast. Never fit up a primer and then carry it around or proceed with other work. Do everything else first and then prepare the primer. Open the paper wrapping at the end of the plug of gelignite and make a hole to take the detonator. Wooden skewer sticks are supplied in explosive cases for this purpose or the tapered end of the crimping pliers may be used. Insert the detonator gently into the hole and fold the paper wrapping round the fuse. A final tie-up with string is a useful precaution against the detonator coming out and causing a misfire. A word of caution here:—if the explosive seems hard, do not attempt to force the detonator into it; enlarge the hole until it fits easily. Some grades of explosives are harder than others. Gelignite is generally soft but may harden when stored in a hot place. If this has occurred it is best to use fresh soft material for the primer and avoid any accident which might be caused by forcing a detonator into hard material. In any case always make a hole first with the wooden skewer.



BLOCK-PLIERS
Approved type of crimping pliers or detonator nippers

LOADING AND FIRING

When several plugs are used in one hole they should be inserted one at a time and tamped firmly in contact with one another by means of a wooden rod. The use of steel or any hard metal is against Mines Regulations and is considered a dangerous practice. Finally the primer is inserted and the hole filled with damp earth or loam which is again tamped firmly with the wooden rod. Fuse can be fired with a match if the end is split open so as to expose part of the powder filling. An effective method is to hold the matchhead in contact with the powder and

ignite it by striking the box against the match-head. When several fuses have to be started at the same time it is best to use a two minute fuse igniter. These are like a firework. They burn with a short fierce flame for two minutes and will light a series of fuses with certainty. By noting the second hand on a watch when the fuse is fired, one can always know just when the charge will fire by allowing 90 seconds for each yard of fuse.

ELECTRIC FIRING

No. 6 detonators can also be obtained for electric firing. They are made of copper instead of aluminium and fitted with copper wires varying from 54 in. to 120 in. long as required for various purposes. A low voltage current fires a match-head inside the detonator and this in turn fires the exploding composition. In practice several detonators can be connected in series and joined by a long length of strong flexible cable to a special blasting machine which supplies the necessary electrical impulse for firing. This method is widely used in quarry blasting where a whole rock face can be blown down at one press of the button on a blasting machine . As far as the farmer is concerned, electric firing is not recommended unless one is prepared to spend money on the proper equipment. Ordinary electric lighting flex is sometimes used for the connecting cable; it is not strong enough to withstand rough conditions and fails to fire because of a break somewhere in the wire. Car batteries may be effective for firing under some conditions but with added resistance of long connections the voltage may not be quite high enough, especially if several detonators are wired together.

Electric blasting requires an adequate blasting machine of approved design and a large coil of strong connecting cable. These are available from the explosives agents who will also provide further details of the manner of connecting and firing.

DETONATING FUSE

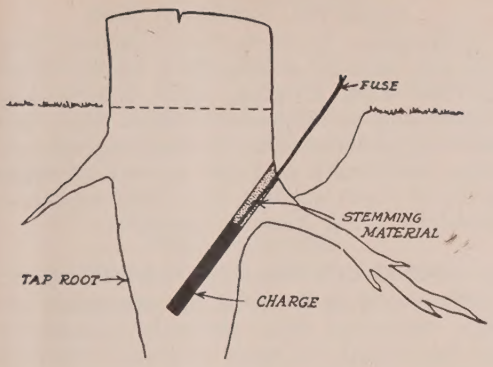
This special fuse has a wide application in quarry blasting but is not normally used for small works. It consists of a white or yellow plastic tube, about the same size as safety fuse, filled with a white powder explosive which detonates at extremely high velocity, higher than the reaction velocity of gelignite. It cannot be ignited with a match but requires the shock of a No. 6 detonator. The detonator is tied or taped to the fuse and fired by safety fuse. In Australia the name of Nobel's detonating fuse is "Cordtex"; it explodes with a sharp report and burns at the rate of nearly 4 miles per second. Cordtex has been found useful for ringbarking trees. It is simply coiled tightly around the tree trunk and ignited by fuse and detonator. The sharp explosion is sufficient to strip the bark without damaging the wood.

APPLICATIONS TO AGRICULTURE
LOG SPLITTING

For logs up to 3 feet in diameter the "Log-Splitting Gun" is still widely used and accounts for most of our sales of blasting powder in some districts. The powder charge is ignited directly by safety fuse and it must be remembered that blasting powder is sensitive to flame or spark. Always keep it in a well covered tin canister and avoid any temptation to smoke while carrying or using blasting powder. Although this rule is applied with all explosives it is especially important with any form of gunpowder. For larger logs it may be necessary to bore holes in the sides and charge with gelignite. Experience is necessary to estimate the size and placing of charges but generally only a few ounces of explosive are required for each hole.

BLASTING OF STUMPS OR TREES

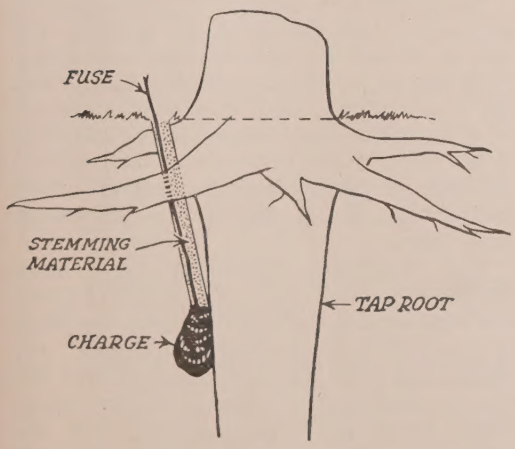
Considerable experience and judgment are required to obtain the best results with a minimum of labour and explosive. Factors to be considered are the type of root system and whether it be green or dry. The nature of the soil is also important. Space does not permit of great detail but the diagrams are likely to be more useful than a lengthy description of the method. The dotted lines shown, represent the extent of blast from a charge placed underground. Generally the diameter at the top is a little less than twice the depth of the hole. The charge should be deep enough for the cone to include all the stump and part of the



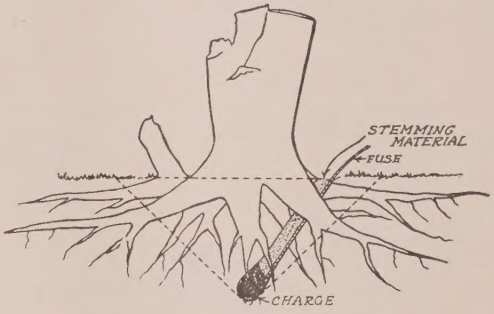
Placing of charge in a tap-root. Hole bored with a 1½ inch. auger

main roots. Holes are drilled with an earth auger of 1½ or 2 in. size and in sandy or crumbly soil the addition of water may help to prevent the holes falling in. Gelignite can be used successfully but a more heaving effect is obtained using Quarry Monobel with a gelignite primer. Fuse firing is generally used. Several charges in a small area can be fixed at the same time using fuses of adequate length and a two minute fuse igniter to light them all promptly. Electric firing ensures that all charges explode at the same time but should only be used when at least 100 yards of strong cable and an approved exploder are available.

In placing the charge, a wooden tamping rod must be used to press each cartridge in place. After placing the primer the hole must be filled with moist soil free from stones and finally tamped firmly. No explosive exerts its maximum effect unles it is well-confined. There are several methods of dealing with large tap-roots as shown in the accompanying diagrams. When it is desired to concentrate a larger charge at the bottom of the hole as shown in some of the drawings, this is done by "bulling" the hole. A small charge is first fired at the bottom to enlarge it and form a cavity into which several plugs can then be packed. After "bulling" a hole it is most important to allow time for cooling before placing the main charge. Pouring water into the hole will assist cooling but it is dangerous to pack a charge into a hot hole.



Placing of heavy charge against a tap root. Hole dug with a shovel or post-hole digger

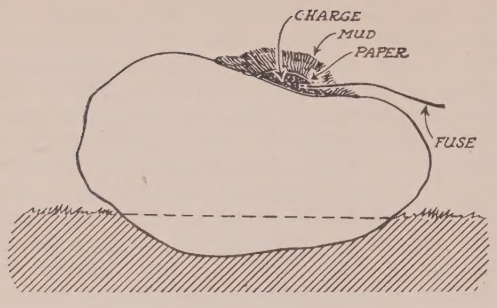


Location of charge for an evenly rooted stump

The important principle of blasting stumps is that the work can be done effectively and economically by placing small charges in the right places. Too frequently there is a mistaken idea that it is necessary to dig a large hole under the stump and blast it to the heavens with one large charge. This is both dangerous and expensive.

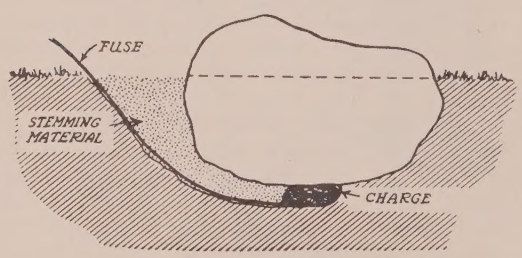
BREAKING BOULDERS

Rock drills are not generally found on farms and boulders are broken either by "mud capping" or by "snakeholing." The diagrams show what is meant by these terms. Mudcapping is the same as plaster shooting and a high strength explosive is necessary. Gelignite is satisfactory but better results are obtained with Gelatine Dynamite or Plastergel. A charge of 8-16 oz. per cubic yard of rock is placed in close contact with the rock and covered



Breaking a boulder by plaster-shooting or mud-capping

with stiff damp clay to exclude all air holes. When fired, the effect is that of a sharp hammer blow on the rock. The same procedure is used in the foundry or scrap-yard for breaking large steel castings for remelting.



Lifting and breaking a partly buried boulder by "snake-holing"

TREE PLANTING

Explosives not only dig the hole but also loosen up the surrounding soil. Blasting should be done only when the soil is dry and satisfactory results can be obtained by a charge of 4 to 8 oz. at a depth of 3 feet.

SUB-SOILING

This is a useful means of loosening up soils which are hard and impervious. Small underground explosions are effective to a much greater depth than is normally obtained by ploughing. Holes are bored to 2 or 3 feet at intervals of from 10 to 20 feet apart and charges of about one plug are placed in each hole. The holes are filled and tamped firmly with earth and fired by fuse. Best results are obtained when the ground is dry.

GENERAL APPLICATIONS

Explosives have certain general and obvious uses in developing a farm. These include dam sinking, well sinking and excavation of ditches or drains. The ring-barking of trees with Cordtex has already been mentioned and the placing of fence posts in hard ground can often be facilitated by small blasting charges.

DESTRUCTION OF EXPLOSIVES

Unwanted or deteriorated explosives are best destroyed since there is no purpose in continuing to keep material which is potentially dangerous and is frequently forgotten by the owner. The question arises how this should be done. To dispose of a few odd plugs the obvious way is to tie them together and fire them with fuse and detonator in a hole. Detonators can be fired together from a fuse crimped to one cap but no more than 100 should be so fired together and always at least 12 inches below the surface. Safety fuse can be burned safely on an open fire.

If the owner has no extent of private property on which to fire explosives he can deliver them to a Police Station or call a Mines Inspector or the Inspector of Explosives for assistance. In the metropolitan area the Explosives Branch will collect and destroy any unwanted material or it can be taken to a Police Station. Explosives must never be thrown into any dam, creek, lake or river and must not be thrown away or discarded with other rubbish.

Gelignite and similar nitro-compound explosives are destroyed by burning but this is a task for an experienced person. It is commonly thought that gelignite will burn safely but there is always a danger of detonation particularly if the material is too closely packed. No person should attempt to burn these explosives unless instructed by a Mines or Explosives Inspector.

The foregoing comments have been necessarily brief and the writer is only too well aware that the subject has been covered in a very sketchy manner. For those who wish to learn more about the nature and uses of explosives the books listed below are recommended. All are available at reasonable cost through bookshops in Perth.

ACKNOWLEDGMENT

The illustrations used in this article were printed from blocks supplied for the purpose by Messrs. Nobel (Australasia) Pty. Ltd. and their ready co-operation in this respect is acknowledged with appreciation.

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TOXIC PLANTS IN HORTICULTURE

By R. D. ROYCE, Officer in Charge, Botany Branch

During the past few months several talks presented on this session have dealt with toxic plants which are commonly grown in gardens. Oleander, one of the most poisonous plants known, Cape Lilac which has caused sickness amongst young children, Boobyalla and many other plants have been discussed in detail.

A number of enquiries have been received at the Department of Agriculture regarding these trees, particularly with reference to the advisability of retaining or growing them in gardens. The mere fact that they contain a toxic principle is to many people, far more important than the other obvious advantages that the plants may have to offer. For instance the three species mentioned are all hardy drought resistant plants which are amongst the best that can be grown under the hardest conditions, and because of this and despite their toxic nature, they will most certainly continue to be widely used. The only class of plant which could reasonably be banned from gardens are those which produce severe allergies, particularly the species of Rhus which can cause intense dermatitis without direct contact with the victim.

The mere statement that a plant is toxic, does not necessarily mean that it is dangerous to human beings, or that it should be destroyed. The statement is frequently made with respect to the grazing of the plants by animals, and the toxicity of leaf material is unlikely to cause any trouble to humans. Only if the fruit or sap is poisonous, or the plant is capable of causing mechanical injury is it of any real significance.

The principal consideration is how the plants should be handled and where they should be grown. The proper planning of a garden usually involves a considerable amount of thought, and this is particularly important when dealing with plants which produce poisonous fruits. Shrubs and trees of this type should be planted in the centre of garden beds and surrounded by other shrubs, or where the garden is in front of a wall or fence line, they should be planted at the back.

If used as specimen trees and grown in an open area they should be carefully pruned and shaped to keep the fruit out of reach of children. In their early stages of growth before pruning is possible, the fruit should be removed manually before it matures. The shrubs, as for example Lantana, should not be used as hedges or border plants where children would have ready access to the fruit.

Plants which produce irritant sap also need careful handling, and the use of gloves can usually provide the necessary protection. Poinsettia, Snow-on-the-Mountain and similar plants frequently cause skin trouble in susceptible people, while the Purple Trumpet Flower is reputed to have caused the blindness of a gardner who pruned the plant. Under normal gardening practice, however, adequate precautions can be taken against this type of plant.

The third type includes such plants as Wigandia which has an irritant hairy indumentum, and the Queensland Pyramid Tree. This species produces a pod in which the seeds are protected by masses of fine rigid fibres and these are capable of causing skin irritation, particularly in hot weather. Spiny plants such as Honey Locust, False Acacia and Duranta are perhaps in this category too, and all of them can be planted in the same positions as those trees which produce poisonous fruits.

It is quite obvious then that the mere fact that a plant is known to be harmful need not necessarily debar it from use in horticultural practice. Many plants other than those mentioned here are valuable plants, although poisonous, and they will continue to be grown without trouble, provided due care is exercised in their use.

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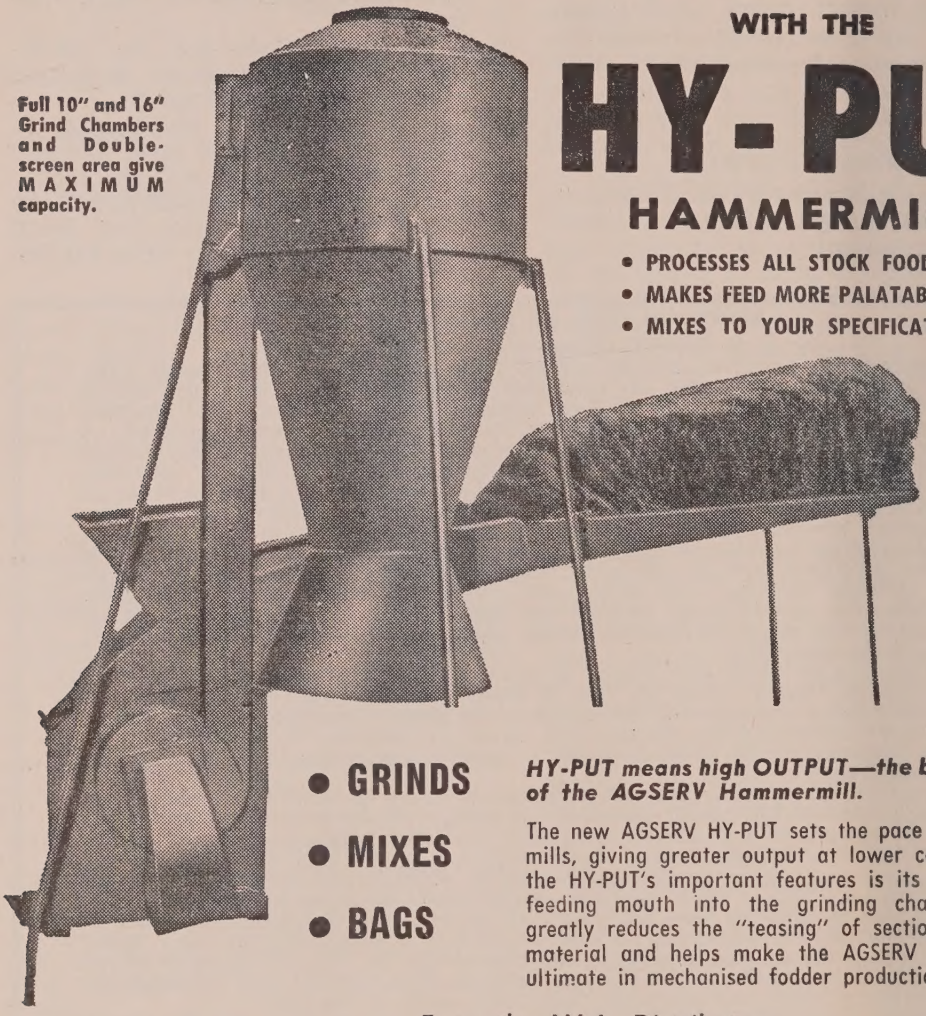

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Wheat Variety Trials on Research Stations

By J. T. REEVES, M.Sc. (Agric.), Plant Breeder and J. L. McMULLAN, B.Sc. (Hons.), Adviser Wheat and Sheep Division.

THE results of wheat variety trials at seven Research Stations in the medium and low rainfall areas for the years 1957, 1958 and 1959 are presented and discussed. The trials are designed to give information on yield and flour quality of promising crossbreds originating from local breeding programmes and newly produced varieties from other parts of Australia. Large scale variety trials are the final tests in the long process of selection and testing which is essential before a new crossbred can be released. The new wheats are compared with standard ones under different conditions of soil and climate.

DESCRIPTIONS OF NEW WHEATS

The new wheats under test in this series of trials were:—

(a) Midseason Maturing.

Claymore—produced by Roseworthy College, South Australia, from the cross Gabo x (Dundee x Caliph).

Olympic—produced by the Victorian Department of Agriculture from a cross between Baldmin and Quadrat.

W.37—bred at Wongan Hills from a cross between Kondut and Dowerin.

M.121—bred at Merredin from the crosses Doubbi x Gabo x (Bencubbin)[3].

(b) Early Maturing.

Dirk 48—produced at the Waite Agricultural Research Institute, S. Australia from the crosses Gabo x (Dirk)[4].

Heron—released by the New South Wales Department of Agriculture from the multiple cross (Ranee x Doubbi x Ranee) x Insignia x (Insignia 49)[3].

W.34 & W.35—produced at Wongan Hills from crosses between M.67 and Charter, and Gluclub and Charter respectively.

W.36, W.38 & W.39—produced at Wongan Hills from a cross between Javelin and Dowerin.

M.120—bred at Merredin from a cross between M.64 and Bungulla.

LOCATION OF TESTING SITES

The research stations concerned in testing are located as follows:—

Avondale.—Four miles west of Beverley in a Dwalganup subclover area.

Chapman.—Approx. 28 miles north-east of Geraldton, also situated in a Dwalganup subclover area.

Merredin.—160 miles east of Perth. The trials are sown on land fallowed the previous season.

Newdegate.—In the south eastern wheatbelt approximately 90 miles east of Wagin.

Salmon Gums.—On the railway line between Esperance and Kalgoorlie in a barrel clover growing area.

Wongan Hills.—120 miles north-east of Perth. Dwalganup subclover is reasonably well established, although the annual rainfall is only 14 inches.

Esperance.—The station is approx. 18 miles north of the town. The trials are sown on well established subclover pastures. Yields are sometimes reduced due to infection with root rotting fungi including "Takeall".

The testing stations cover a wide range of seasonal and soil conditions and yields fluctuate markedly from season to season and from station to station. Lack of good finishing rains at Merredin and Salmon Gums frequently reduce yields.

SEASONAL CONDITIONS

Average rainfall for the months of March to October for the seven research stations are given in Table 1. In general, good opening rains were received in May and June 1957, although growth was retarded by wet cold conditions in July and August. All stations received below average falls in September and October with consequent effect on grain yields. These were about equal to the overall average at Newdegate, a little below average at Avondale and Chapman and well below average at Salmon Gums, Merredin, Esperance and Wongan Hills.

Good opening falls in May and June 1958, and good finishing rains in September and October were received at all stations. The result was above average yields at Avondale, Salmon Gums, Merredin and Esperance. At Chapman and Wongan Hills, yields were nearly equal to the average, the reduction possibly being due to root-rots.

Below average rains were received at all stations in May 1959, but were all above average in June. This was followed by

Table 1

AVERAGE RAINFALL AT RESEARCH STATIONS TO 1959

STATION	March	April	GROWING PERIOD							Annual Total
			May	June	July	August	Sept.	Oct.	Total	
AVONDALE—										
Average 33 years	75	85	211	316	298	216	101	78	1220	1544
CHAPMAN—										
Average 54 years	59	75	236	409	389	261	135	89	1520	1787
ESPERANCE—										
Average 10 years	48	107	208	246	201	204	255	184	1299	1804
MERREDIN—										
Average 49 years	85	80	143	189	185	146	83	73	818	1180
SALMON GUMS—										
Average 34 years	112	87	122	152	139	140	121	117	791	1318
NEWDEGATE—										
Average 5 years	54	108	141	204	170	134	146	94	910	1411
WONGAN HILLS—										
Average 34 years	80	86	195	264	263	198	91	69	1079	1404

Table 2

WHEAT VARIETY TRIALS AT RESEARCH STATIONS, 1957/58 SEASON

VARIETY	AVONDALE			CHAPMAN			MERREDIN			NEWDEGATE			SALMON GUMS			WONGAN HILLS			ESPERANCE		
	1957 Yield		Av. %	1957 Yield		Av. %	1957 Yield		Av. %	1957 Yield		Av. %	1957 Yield		Av. %	1957 Yield		Av. %	1957 Yield		Av. %
	Bush./ac.	%		Bush./ac.	%		Bush./ac.	%		Bush./ac.	%		Bush./ac.	%		Bush./ac.	%		Bush./ac.	%	
Midseason Maturing																					
Bencubbin 48	18·1	100	(7) 100	10·9	100	(7) 100	4·3	100	(7) 100	11·2	100	(2) 100	5·2	100	(6) 100	12·9	100	(6) 100	15·4	100	(6) 100
Kondut	19·7	109	(7) 109	13·5	124	(7) 113	..	..	..	12·1	108	(2) 108	..	..	..	13·3	103	(6) 104	..	..	..
Eureka	18·6	103	(7) 113	13·3	122	(7) 113	4·5	105	(2) 91	12·9	115	(2) 106	2·3	44	(6) 100	12·2	95	(6) 104	16·7	108	(5) 113
Sabre	18·4	102	(4) 108	14·0	128	(4) 115	6·1	142	(4) 108	12·9	115	(2) 106	5·5	106	(3) 99	13·5	105	(4) 95	15·4	100	(4) 106
Moora (M. 114)	20·5	113	(3) 107	14·0	128	(4) 115	4·3	100	(3) 98	10·6	95	(2) 100	5·5	106	(3) 99	13·1	102	(3) 99	13·3	86	.
Claymore	19·5	108	.	13·0	119	(3) 107	4·2	98	..	13·1	117	.	4·4	85	(3) 91	13·5	105	.	.	.	.
Olympic	19·6	108	.	14·9	137	.	2·9	67	.	11·8	105	..	3·8	73	.	14·1	109	....	.	.	.
Panther	..	..	..	13·0	119	..	.	..	.	12·5	112	..	4·7	90	.	.	....	.	11·7	76	(6) 100
Bencubbin	....	....	.	.	..	.	.	....	.	....	....	..	.	.	....	....	....	....	....	....	....
							6·1	142	(6) 109	.	....	....	.	.	....	....	....	....	....	....	....
Diff. for sig (5%)	N.S.	N.S.	....	1·6	15	.	1·1	27		0·9	8	..	0·9	17	.	N.S.	N.S.	....	2·0	13	....
Early Maturing																					
Wongoondy	13·2	100	(11) 100	17·0	100	(10) 100	5·1	100	(12) 100	10·2	100	(2) 100	8·4	100	(9) 100	8·2	100	(11) 100			
Gabo	15·7	119	(11) 105	19·4	114	(10) 103	8·2	161	(12) 97	11·3	111	(2) 99	8·5	101	(9) 97	7·9	96	(11) 107			
Insignia 49	14·6	111	(6) 113	17·4	102	(6) 111	5·6	110	(7) 103	9·6	94	(2) 92	7·4	88	(5) 108						
Dirk 48	11·9	90	.	18·3	108	..	6·2	122	.	7·9	77	....	5·4	64	....						
M. 120	12·8	97	(2) 95	17·3	102	(2) 99	5·0	98	..	....	....	....	..	..	..						
W. 34	13·2	100	(2) 101	.	..	....	7·0	137	(3) 96	8·9	87	(2) 89	8·2	98	....	....	....	....	....	....	....
W. 35							6·4	125		..	....	..	7·8	93							
Diff. for sig (5%)	N.S.	N.S.		0·7	4		1·5	30		1·4	14	..	0·6	8	..			....	....	....	....

N.B.—Figures in brackets indicate the number of years under trial.

Table 3

WHEAT VARIETY TRIALS AT RESEARCH STATIONS, 1958/59 SEASON

VARIETY	AVONDALE			CHAPMAN			MERREDIN			NEWDEGATE			SALMON GUMS			WONGAN HILLS			ESPERANCE		
	1958 Yield		Av. %	1958 Yield		Av. %	1958 Yield		Av. %	1958 Yield		Av. %	1958 Yield		Av. %	1958 Yield		Av. %	1958 Yield		Av. %
	Bush./ac.	%		Bush./ac.	%		Bush./ac.	%		Bush./ac.	%		Bush./ac.	%		Bush./ac.	%		Bush./ac.	%	
Midseason Maturing																					
Bencubbin 48	23·2	100	(8) 100	23·2	100	(8) 100	19·7	100	(7) 100	8·6	100	(3) 100	28·6	100	(7) 100	13·3	100	(7) 100	23·0	100	(7) 100
Claymore	30·2	130	(2) 121	27·1	117	(2) 123	21·9	111	(2) 108	9·4	109	(2) 107	33·5	117	(2) 110	15·5	117	(2) 111	34·1	148	....
Eureka	30·2	130	(8) 116	27·9	120	(8) 115	20·1	102	(3) 98	8·8	102	(3) 105	31·1	109	(7) 102	18·8	141	(7) 108	34·1	148	(6) 123
Kondut	30·1	130	(8) 112	26·1	112	(8) 113	....	....	....	10·7	122	(3) 112	....	....	....	17·3	130	(7) 107	....	....	....
Moora	29·8	128	(4) 114	24·7	106	(4) 106	18·7	95	(4) 97	9·0	105	(2) 112	26·3	92	(4) 91	15·7	118	(4) 102	27·1	118	(2) 105
Olympic	30·8	133	(2) 122	27·5	119	(2) 119	21·4	108	(2) 101	12·6	147	(2) 127	....	....	....	15·3	115	(2) 112	....	....	....
Sabre	28·3	122	(5) 111	27·3	118	(5) 116	20·6	105	(5) 107	8·9	103	(3) 101	32·7	114	(4) 106	16·3	123	(5) 99	27·8	121	(5) 110
Bencubbin	....	....	....	....	....	....	21·5	109	(7) 109	....	....	....	....	....	....	....	....	....	....	....	....
W. 37	27·3	118	....	....	....	....	....	....	....	....	....	....	....	....	....	15·5	117	....	....	....	....
Diff. for sig (5%)	1·3	6	....	2·0	9	....	N.S.	N.S.	....	2·1	24	....	1·6	6	....	1·9	15	....	3·0	13	....
Early Maturing																					
Wongoondy	32·5	100	(12) 100	15·9	100	(11) 100	23·8	100	(13) 100	3·6	100	(3) 100	33·9	100	(10) 100	12·1	100	(12) 100	....	....	....
Gabo	35·9	110	(12) 106	16·8	106	(11) 103	20·1	84	(13) 96	4·1	114	(3) 101	39·6	117	(10) 101	14·7	121	(12) 108	....	....	....
Dirk 48	30·0	92	(2) 92	17·7	111	(2) 109	16·4	69	(2) 78	3·8	106	(2) 85	29·7	88	(2) 83	13·5	112	....	....	....	....
Insignia 49	*	....	....	13·1	82	(7) 108	23·2	97	(8) 101	4·2	117	(3) 95	38·5	114	(6) 110	12·9	107	(7) 109	....	....	....
M. 120	30·7	94	....	15·8	99	....	20·8	87	(2) 89	3·1	86	....	....	....	....	....	....	....	....	....	....
W. 36	28·2	87	....	....	....	....	....	....	....	....	....	....	....	....	....	13·0	107	....	....	....	....
W. 38	30·2	93	....	....	....	....	....	....	....	....	....	....	....	....	....	13·1	108	....	....	....	....
Diff. for sig (5%)	2·1	7	....	1·4	9	....	2·0	9	....	N.S.	N.S.	....	1·8	5	....	1·2	10	....	....	....	....

* Accidentally omitted from trial.

N.S.—Denotes differences between varieties are not significant.

Table 4

WHEAT VARIETY TRIALS AT RESEARCH STATIONS, 1959/60 SEASON

VARIETY	AVONDALE			CHAPMAN			MERREDIN (a)			MERREDIN (b)			NEWDEGATE			SALMON GUMS			WONGAN HILLS			ESPERANCE		
	1959 Yield		Av. %	1959 Yield		Av. %	1959 Yield		Av. %	1959 Yield		Av. %	1959 Yield		Av. %	1959 Yield		Av. %	1959 Yield		Av. %	1959 Yield		Av. %
	Bush./ac.	%		Bush./ac.	%		Bush./ac.	%		Bush./ac.	%		Bush./ac.	%		Bush./ac.	%		Bush./ac.	%		Bush./ac.	%	
Midseason Maturing																								
Moora	21·3	100	(5) 100	25·9	100	(5) 100	11·4	100	(4) 100	23·2	100		15·6	100	(3) 100	28·5	100	(5) 100	26·0	100	(5) 100	30·8	100	(3) 100
Claymore	25·7	121	(3) 105	26·2	101	(3) 107	10·0	88	(3) 105	24·2	104		14·3	92	(3) 94	27·2	95	(3) 109	29·0	112	(3) 106	30·0	97	(2) 111
Eureka	24·7	116	(5) 103	25·0	97	(5) 104	9·8	86	(4) 97	24·6	106		12·6	81	(3) 91	25·0	88	(5) 102	26·4	102	(5) 105	31·9	104	(3) 116
Kondut	21·0	99	(5) 100	25·3	98	(5) 103	..	..	..	..	..		14·3	92	(3) 98	..	....	....	24·7	95	(5) 104	....	....	....
Olympic	28·5	134	(3) 110	26·5	102	(3) 105	11·7	103	(3) 104	25·9	112		15·0	96	(3) 106		....	....	30·1	116	(3) 108	....	....	
Bencubbin	....	....	....	....	....	....	12·1	106	(4) 107	27·0	116	....	14·8	95	....	....	....	....	....	....	....	....	....	
M. 121	22·2	104	....	....	....	....	12·1	106	....	....	....	....	14·1	90	....	....	....	....	25·5	98	....	....	....	
Diff. for sig. (5%)	3·1	15	....	N.S.	N.S.	....	1·6	14	....	2·2	9	....	2·1	13	....	2·1	7	....	1·5	6	....	N.S.	N.S.	
Early Maturing																								
Wongoondy	29·0	100	(7) 100	31·4	100	(8) 100	18·7	100	(9) 100	26·2	100		15·9	100	(4) 100	29·8	100	(7) 100	29·5	100	(8) 100	.	.	
Gabo	32·6	113	(7) 113	34·0	108	(8) 107	17·1	91	(9) 96	25·9	99	....	15·5	97	(4) 100	33·5	112	(7) 105	32·1	109	(8) 110	..	....	
Insignia 49	35·7	123	(7) 115	33·1	105	(8) 107	14·4	77	(9) 98	25·3	97	....	19·5	123	(4) 104	30·1	101	(7) 108	32·6	111	(8) 109	. .	....	
Heron	....	....	....	....	....	....	14·5	78	....	....	....	....	20·9	131	....	....	....	....	33·8	115	....	.	. .	
W. 38	28·6	99	(2) 96	27·3	87	....	14·8	79	....	22·5	86	....	15·6	98	....	26·7	90	....	29·7	101	(2) 103	....	. .	
W. 39	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	27·1	92	....	....	.	
Diff. for sig. (5%)	2·1	7	....	0·9	3	....	1·7	9	....	1·2	5	....	1·5	....	....	1·6	5	....	1·8	6	....	.	.	

(*a*) Sown on "heavy" clay loam. (*b*) Sown on "light" sandy loam.

good falls in September and October at Avondale, Salmon Gums, Esperance and Newdegate, consequently yields were higher than average.

At Chapman and Wongan Hills falls in September were well below normal but this must have been offset by the good rains in August and also in October as yields were a little above usual.

September rainfall at Merredin was a little below average. This was followed by a dry October. Yields in the trial planted on light land were satisfactory, but were very poor in the trial planted on heavy land.

TRIAL RESULTS

Yields for the seasons under review are shown in tables 2 to 4. Two points should be noted—

(a) In the midseason maturing section, Bencubbin 48 was used as the "control" variety in 1957 and 1958, Moora in 1959.

(b) After the 1959 season a portion of the data was recalculated in order to compare the average percentage yields for Gabo and Wongoondy with Insignia 49 for the same years. The comparison between Gabo and Insignia 49 is more valid when they are in the same trials for the same years.

EARLY MATURING VARIETIES

Insignia, Insignia 49 and Gabo have been equal to or higher yielding than Wongoondy. The exception is at Merredin where Wongoondy has been slightly higher over a nine year period (See Table 4.) In flour quality. Insignia 49 is classified as a weak wheat, the other two as medium-strong to strong.

The crossbreds W.34, W.35, W.36, W.38 and W.39 possess satisfactory flour quality and disease resistance, but yields have been disappointing. Consequently they have been discarded, with the exception of W.39. Dirk 48 and M.120 have been discarded for the same reason.

The new variety Heron was the highest yielder in two out of three trials in 1959. It is similar to Insignia 49 but is also resistant to bunt.

MIDSEASON MATURING VARIETIES

Kondut and Eureka yielded well particularly in the higher rainfall areas. The former is susceptible to rust. Moora also gave satisfactory yields, but was withdrawn from further trials because of its low bushel weight. Formerly the crossbred M.114, it was released as a replacement for Bencubbin 48. Claymore and Olympic yielded well at most sites. The former is medium-strong in flour quality, the latter is weak to medium.

The crossbred M.121 produced at the Merredin Research Station, yielded well on heavy land at this site in 1959, but was relatively unimpressive in other trials. It is of satisfactory flour quality. W.37 from Wongan Hills, was tested only in 1958 and was then withdrawn until it could be fixed for ear type.

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Arrangements have been made for the compilation of a comprehensive index to be incorporated in the December issue—a feature which will greatly enhance the value of the Journal as a work of reference.

WHEAT QUALITY

IN August, 1956, the Australian Agricultural Council agreed that, as a first step in the further examination of all aspects of the subject of wheat quality in Australia, a conference of all interested parties should be convened by the Department of Primary Industry.

As a result of this conference in November, 1956, a Production Committee, known also as a Technical Committee, and a Marketing Committee were established to study aspects of this subject. The findings of these Committees were considered by another conference of the interested parties held in May, 1960, and reported to another meeting of the Australian Agricultural Council. The Council recommended the setting up of appropriate Committees within each State, where they do not already exist, to examine the problem and make recommendations as to action desirable or necessary to improve the position.

A committee was formed in this State on the following basis of representation

Farmers' Union—3 representatives,

Australian Wheat Board—1 representative,

Co-Operative Bulk Handling Ltd.—1 representative,

W.A. Flour Millowners' Association.—1 representative,

Department of Agriculture—1 representative,

with a technical officer of the Department of Agriculture as Secretary.

A report of the first meeting of the committee was forwarded to the Minister for Agriculture (The Hon. C. D. Nalder) who stated that he was pleased to receive and to make available the report.

An important function of this Committee is to make recommendations with the object of raising the level of quality of the grain harvest. Wheat quality improvement is a very complex question with many facets and not possible of simple solution. It must be a long term project. However the Committee at its first deliberations has been able to put forward some suggestions for farmers which he (Mr. Nalder) considered represented the logical first step in any grain improvement programme.

The Committee considered that uniformity in grain type and characteristics was a very desirable objective in any quality improvement programme. In this State, more than 80 varieties of wheat covering a wide range of grain and flour qualities are grown. Obviously each farmer grows a particular selection of varieties because he feels that they are best suited to his conditions and will give him the greatest total returns. It is reasonable to assume that an intelligent reduction in the number of varieties grown and based on their known characteristics could result in greater uniformity. From the latest statistics available, the 1959-60 season, nine varieties represented over 94 per cent. of the total area sown. For a number of reasons including the range of growing conditions throughout the wheatbelt; the length of the growing season; soil variations; and disease considerations —it would be impossible and unrealistic, at this stage to suggest a limited number of varieties which would result in complete grain uniformity. This however, must be long term objective, including the programme of the plant breeder.

In its report the Advisory Committee submitted suggestions as guidance to farmers when considering wheat varieties suitable for planting. These are:—

(a) Sowing in general should be confined to the following varieties,

depending on maturity, soil conditions and the general suitability of the variety to the particular district.

Bencubbin. — Mid-season maturing. Medium tall to tall straw which shows a tendency to weakness under high rainfall, high fertility conditions. Susceptible to rust. Suited to early sowing in the drier districts.

Bungulla.—Very early maturing. Medium tall to tall straw with a tendency to weakness under high rainfall, high fertility conditions. Susceptible to rust. Suited to later sowing in the drier districts.

Eureka. — Mid-season maturing. Medium tall, strong straw. Very suitable to the northern areas, because of its rust resistance.

Gabo.—Early maturing. Short to medium height strong straw. Susceptible to flat smut and rust. Especially suitable for most districts.

Kondut. — Late mid-season maturing. Medium tall strong straw. Susceptible to rust. Suited mainly to medium and high rainfall conditions.

Wongoondy.—Early maturing. Medium tall, strong straw. Because of its rust resistance very suitable to the northern wheatbelt.

(b) It is recommended that farmers should not grow either Bluclub or Gluclub for general delivery to the bulk handling system but only for specific orders such as for biscuit makers. Both are very weak soft varieties. Bencubbin 48, a soft wheat with hard grain of poor milling quality is not now recommended.

(c) Strong hard varieties such as Festival, Koda, Saga and Spica should only be grown on heavy land in short season districts where the intention is for sale as premium grain to individual millers and the prospect of this appears justified.

It will be noted that neither Insignia nor Insignia 49 are recommended, with the implied suggestion that these be gradually discarded. Insignia 49 was sponsored by the Department because of its rust resistance but as this has broken down due to the occurrence of a new strain there is now no point in growing it on this score. Further, more recent information including the experience of flour millers suggest that it is not a good grain quality variety under W.A. conditions and the Committee has therefore suggested that it should be replaced with one of the early varieties mentioned, appropriate to the particular district.

Farmers will have made their seed reservations for the coming season and in many cases it would be impossible for them to arrange to confine their sowings to the recommended varieties. However, it is suggested that they should at least make this their objective for future years even if it is impractical for 1962.

The Committee's recommendations were not intended to restrict farmers experimentation with new varieties which might be available from other States but it suggested that the main sowings should be confined to the varieties listed. It is strongly urged that farmers should not import seed of the extremely poor quality soft variety Glenwari.

The Department of Agriculture obtains small quantities of all new productions from other States for experimental sowing and assessment of suitability for this State and would be able to offer comment on any variety which a farmer might wish to import.

PLANT DISEASES

LEAF SPOT OF CELERY

By S. C. CHAMBERS, M.Sc., Plant Pathologist

LEAF SPOT is the most serious disease of celery in Western Australia, and causes heavy losses in many crops during the cold wet months of June, July and August. The disease is incited by the fungus Septoria apii Chester, and was first recorded in this State at Osborne Park in 1923. Since then it has become a limiting factor in the production of marketable celery during the winter months.

SYMPTOMS

Usually the disease first becomes evident on the older, lower leaves of a plant and gradually spreads upwards and inwards to the younger foliage.

On the leaves, it causes somewhat circular spots, which seldom exceed $\frac{1}{8}$ in. in diameter. These are yellow to brown at first, but later become stippled in appearance and finally almost black, as large numbers of minute black fungal bodies (pycnidia) are formed in them. When the spots are very numerous, coalescence frequently occurs, and results in the partial, or complete collapse of leaflets and leaves.

Spots on the stems differ slightly in appearance, in that they are more elongated than those on the leaves.

INTRODUCTION AND SPREAD

The disease is seed borne and is frequently introduced into the field planting by means of slightly affected seedlings, which escape detection when transplanted from the seed bed. In addition the disease is carried over on infected debris, and overseas reports suggest it may survive for approximately 8 to 11 months in this manner.

During periods of cool, wet weather, numerous fungal seeds, called spores, are

Symptoms of celery late blight on leaf

produced in the pycnidia of leaf spots on affected transplants, and also on crop debris. These are carried about by the wind and infect the foliage of nearby celery plants. With the continuation of cool, wet conditions, more spores are produced in the pycnidia of the new spots and so the disease becomes widespread throughout the crop.

PREVENTION AND CONTROL

1. Hot water treatment of seed: Seed should be enclosed loosely in a muslin bag and immersed in water at 118° F. for 30 minutes. After treatment, the seed should be spread out in a thin layer on an absorbent surface and dried as quickly as possible.

2. Cover Spraying: The crop should be sprayed regularly with Bordeaux 4:4:40. The first application should be made one week after transplanting, and subsequent sprays should be applied at intervals not exceeding 14 days. To overcome the discoloration of foliage caused by Bordeaux, this fungicide should be replaced by Ziram (1½ lb/100 gal.) for the last two applications before harvest.

3. Rotation: The same land should not be used more frequently than once in two years, either for seed beds or for field plantings of celery.

GROSS ENGINE POWER—WHAT IS IT?

The Tractor Testing Committee at its February meeting expressed some concern at confusion arising from the use of the term "Max. engine horsepower—gross." On this basis a tractor of 50 or so drawbar horsepower has been described as a 100 h.p. tractor.

Mr. G. H. Vasey, Officer in Charge, Tractor Testing, explained that gross engine power, or any similar term, can only refer to a stripped engine on a factory test bed; no fan, no generator, air cleaner, exhaust muffler, water pump and so on. All these power consuming, but nevertheless essential, auxiliaries would reduce the so called gross engine power by 15 per cent. or so.

The gross engine power, Mr. Vasey continued, is of acadamic interest, mainly to the engine designer or to the production line checker; the term has no significance for the prospective user, and would better be dropped from advertising. But the user is entitled to know the real power available at the engine crankshaft, so as to have some basis for estimating the power losses in the transmissions to the various outlets, pto, belt pulley, and drawbar.

If the tractor is equipped with a hydraulic torque converter these losses can be quite high, of the order of 15 per cent., for the converter alone, with successive losses in the mechanical transmission, track or wheel slip, and other traction resistances, a drawbar power on the test track of only about 50 per cent. of the gross engine power could be expected.

Australian tractor tests are now conducted so as to reveal the true shaft horsepower of the fully equipped engine as well as the power available at the outlets.

Australian

TRACTOR TESTS

ZETOR 50 SUPER

REPORT ON TEST No. 35 (FARMERS' EDITION)

TESTED FOR MOTOKOV, FOREIGN TRADE CORPORATION, PRAGUE, CZECHOSLOVAKIA

THIS Report is taken from the full Technical Report No. 35; results are shown here in briefer form: fuller explanations are added. Values quoted may be rounded out to two instead of three significant figures; to this extent the values may differ slightly but not significantly from those show in the Technical Report. Some values are taken from graphs shown in the Technical Report, which are not shown here. The Technical Report is not available in large numbers, but it may be seen at, and copies of this farmers' report may be had from, the offices of the State Departments of Agriculture, the Bureau of Sugar Experiment Stations (Queensland), and the Commonwealth Department of Primary Industry.

1.—THE TESTS

Note: The tests are now carried out under a procedure in which the main tests of engine performance are done directly on the engine itself (removed from the tractor for the purpose), and not through the belt pulley.

The belt outlet has been abandoned as the main test at several overseas testing stations in favour of tests on the engine itself (Germany) or on the pto (Nebraska British Standard tests).

After running-in, three types of tests were carried out, in order to measure *the performance of the engine,* as directly measured by the power in the engine crankshaft (horse-power, shp), *the performance of the power outlets,* measured on the pto and belt pulley at their proper speeds, and *the performance of the tractor as a whole,* as measured by drawbar pull, tractor speed, wheel slip, and drawbar horse-power (dbhp), with the tractor running on a bitumen test track.

The main results of these tests are given in Sections 2 and 3. Other measurements and observations were made of various features of the tractor; these are given in Section 5.

The Australian Tractor Testing Committee is a joint body established by agreement between the Commonwealth, the States, and the University of Melbourne; under this agreement, the tests are carried out by the University of Melbourne. The address of the Tractor Testing Committee is: C/o Department of Primary Industry, 301 Flinders Lane, Melbourne.

2.—SUMMARY OF POWER OUTPUT

Table A. (See note (a) below)

	Engine C'shaft	PTO	Belt Pulley	Draw bar
Full power—h.p.	54·9	51·0	50·4	45·0
At engine speed—r.p.m.	1,650	(b)1,550	(c)1,650	1,650
Fuel economy—lb./h.p.-hr.	0·42	0·41	0·45	0·50
Fuel consumption—lb./hr.	23·0	21·0	22·5	22·5
Fuel consumption—gal./hr.	2·8	2·6	2·8	2·8

Rated Speed—1,650 r.p.m.

Fast Idling Speed required to give full power at rated engine speed—1,820 r.p.m.

Crankshaft Torque—at rated speed, 175 lb. ft. ; maximum 187 lb. ft. at 1,000 r.p.m.

Best Economy—0·39 lb./s.h.p.-hr. at 80% load at about 1,200 r.p.m.

(*a*) Observed values, no atmospheric corrections applied to diesel engines.

(*b*) Engine speed required to give British Standard pto speed of 540 r.p.m.

(*c*) Engine speed required to give British Standard belt linear speed of 3,100 fpm.

3.—DRAWBAR TESTS

(1) The following Tables B, C, and D, show the drawbar performance of the tractor on the bitumen test track, on rear tyres 14 x 28, carrying maximum weight (2,300 lb. front, 7,080 lb. rear; total 9,380 lb.), working in the gears named in the tables. Height of drawbar 16½ iuches.

Drawbar tests, using unballasted weight of tractor (6,330 lb.), were carried out, but are not reported here.

Table B.—Maximum Power, Rated (5th) Gear

Rated engine speed, 1,650 r.p.m.	DBHP (*d*)	Pull lb.	Speed m.p.h.	Wheel Slip % (*e*)
Observed maximum dbhp at rated engine speed	45·0	4,500	3·75	8

Table C.—Pull at Maximum d.b.h.p.

All gears, rated engine speed. See note (*f*).

Gear	DBHP	Pull lb.	Speed m.p.h.	Wheel Slip %
1	(*g*) 11	6,360	0·64	18
2	(*g*) 21	6,360	1·23	16
3	(*g*) 36	6,360	2·12	14
4	43	6,200	2·58	11
5	45	4,500	3·75	8
6	46	3,200	5·39	3–5
7	45	1,750	9·56	2–3
8	Road gear, not tested			

Table D.—Fuel Consumption, Various Loads, Rated (5th) Gear

Pull lb.	Percent. of full load	Speed m.p.h.	DBHP	Slip %	Fuel	
					Gal./hr.	lb./dbhp hr.
2,000	44	4·30	23	1	1·6	0·55
2,500	56	4·22	28	2	1·8	0·52
3,200	71	4·13	35	3	2·1	0·49
4,200	93	3·91	44	5	2·6	0·48

(*d*) DBHP is the product of pull (lb.) and speed (m.p.h.) divided by 375.

(*e*) Wheel slip can be measured by noting that, in travelling a given distance, the back wheels make more turns when working under load than when running with no load on the drawbar. The differences in these revolution counts divided by the former count gives the slip as a ratio, which can be written as a percentage (quoted in these tables to the nearest whole number).

(*f*) These are not the maximum pulls available in the gears (i.e., not the maximum sustained pulls), but the pulls at maximum db power, i.e., at full engine power at rated engine speed.

(*g*) Not full engine power, dbhp limited by wheel slip.

(2) Tractor Weights (lb.).

Weight Condition	Front	Rear	Total
Standard, unballasted (*h*)	2,300	4,030	6,330
Full weight, heaviest recommended (*i*)	2,300	7,080	9,380
Includes—			
Water ballast (lb./wheel)	—	405	405
Solid ballast (lb./wheel)	—	1,120	1,120

(*h*) This weight, including driver and fuel, was used in finding centre of gravity.

(*i*) Weight of tractor in drawbar tests quoted in this report.

(3) Wheels and Tyres.

Tyres	Front	Rear
Type	Rib	Open centre bar tread
Size	6·50 x 20, 6-ply	14 x 28, 8-ply
Pressure	38 p.s.i.	14 p.s.i.

4.—THE TEST TRACTOR

(1) The test tractor was declared to have been chosen at random from the current run of production. It received no special attention during assembly; the standard pre-delivery checks usually carried out by the dealer were in this instance done by the Company's representatves at the Testing Station. The tractor was run-in for 12 hours at the testing station.

(2) *Fuel Settings.*—The engine of this tractor has only one fuel setting, at which all the tests were carried out.

(3) *Governor Control.*—The engine was under the control of the governor set to give full throttle and so maximum power at rated engine speed. (See Section 2 above, fast idling speed.)

(4) *Gravity.*—Distillate, Diesel Index 66, Specific Gravity 0.82; weight per Imperial gallon 8.15 lb.

(5) *Specification.*—Engine No. 0/105/01919. See also Section 7.

5.—OTHER OBSERVATIONS

(1) *Duration of Test.*—65 hours, including running-in.

(2) *Repairs and Adjustments.*—Injector nozzles were checked and adjusted during run-in.

(3) *Engine.—Fuel pump setting checked* —within specified limits.

Radiator water used—none.

Lubricating oil—S.A.E., 30.

Weight to engine, 24.7 lb.

Weight from engine after tests, 22.8 lb.

(4) *Steering.*—With track widths, front 47¾ in., rear 58¼in., wheel base 86¾ in.:

Turning circles: Without brakes 27 ft. 10 in. L.H., 27 ft. 0 in. R.H.; with brakes, 23 ft. 8 in. L.H. and R.H.

Comment: Easy to steer under load, sensitive to steering wheel; no power assistance.

(5) *Centre of Gravity,* with tractor unballasted 4½ in. above and 31½ in. forward of rear axle.

(6) *Driver's Accommodation.*—Access to *seat,* from either side forward of rear wheels, step on either mudguard. *Footroom and support,* adequate, driver's area fully floored.

Comfort: plough-type seat suspended on parallel linkage, coil springs and dampers, backrest, removeable upholstery. *Accessibility to controls,* all controls conveniently placed and easily operated.

Noise: sound pressure level measured 3 ft. above loaded seat, in open field—

at full power, rated speed—107 units;

at fast idling speed—104 units.

The special unit is the decibel (db) of pressure compared with a base level of virtual silence. The levels quoted above are typical of tractors, which generally are noisy by accepted industrial standards.

(7) *Instruments.*—All clearly visible, metric units. Indications were consistent throughout tests. Engine tachometer also shows pto speed and road speeds in the gears.

(8) *Inspection of Engine and Transmission after Test.*—After testing, the tractor was partly dismantled and inspected and found to be in a satisfactory condition.

(9) *Instruction Books.*—English language instruction book not available at time of test.

6.—INTERPRETATION OF TESTS

(1) *Power at Outlets (pto and Belt).*

Pto and belt outlets should run at their recommended speeds, which in this instance conform to international standards. The figures shown in Table A represent the powers available at those speeds.

(2) *Fuel Consumption.*

Fuel consumption in galls./hour, though a simple unit often quoted, has little meaning unless the corresponding power output is also quoted. *Specific fuel consumption* (lb./hp-hr), the weight of fuel consumed per unit of energy developed, is a better guide. The unit of energy here is the hp-hr (similar to the electrical unit, the kilowatt-hr). When specific fuel consumption is least, the engine is giving its best economy or efficiency.

Gallons per/hr may be changed to lb/hp-hr as follows (referring to table A above):

2.8 galls/hr while developing 54.9 hp means 2.8 ÷ 54.9 galls/shp/hr = 0.051 gal./shp/hr.

0.051 gall./shp/hr × 8.15 lb./gallon for this fuel = 0.42 lb/shp-hr, as shown.

(3) *Drawbar Tests.*

(i) Drawbar tests are carried out on a hard prepared surface. Most field condi-

tions present higher resistance to the tractor's motion, so that, in the field, the maximum drawbar pulls available in any gear will usually be less than those shown in the tables.

(ii) Wheel slip may also be greater in the field; to that extent tractor speeds in miles per hour in the field will be less than those shown in the tables.

(iii) Because of (i) and (ii) above, the drawbar horsepowers available in any gear in the field will usually be less than those shown in the tables.

7.—BRIEF SPECIFICATIONS
Zetor 50 Super
(Based on Information Supplied by Manufacturers)

(1) *Engine*—No. 0/105/01919.

4-stroke; 4 cylinders, vertical; crankshaft along tractor; direct injection diesel.

Bore, 4.134 in.; stroke 4.724 in.; compression ratio, 16 : 1.

Rated speed: 1,650 rpm.

Other recommended speeds: for pto work, 1,550 rpm.

Fuel type: Distillate.

Fuel system: Motorpal 4-cyl. in-line pump, 6-hole spray type injectors. Two replaceable-element filters in series. Tank capacity, 15 gallons.

Air Cleaner: Oil bath, gauze and centrifugal pre-cleaner.

Governor: Mechanical, incorporated in fuel pump.

Electrical system: 12-volt battery and generator.

Starting: Electric, air heater for each cylinder in intake duct. Decompressor on inlet valves and excess fuel control on pump for extra cold starting.

Cooling: Water (pressure system), 6-blade fan pump, and thermostat. Blind on radiator adjustable from driver's seat.

Exhaust: Vertical ahead of operator.

Lubrication: Oil pump, sump gauze filter, external full flow gauze filter and replaceable element by-pass filter.

(2) *Chassis*—

4-wheel; pneumatic tyres. Wheelbase 86¾ in.

Track widths: Front 50½ in. x 6¼ in. steps to 69¼ in.; rear 54½ in. adjustable to 71¾ in.

Tyre sizes: Front 6.50 x 20; rear 14 x 28.

Steering: Nut and screw drive.

Weight: Maximum, 9,380 lb.

(See Section 3 (2) above).

(3) *Belt Pulley*—

Rear (mounted on pto), rearward working in either direction.

Diameter 9⅞ in.; face width 6¼ in.

Speed (at 1,650 rpm engine speed), 1,210 rpm.

Belt speed (at 1,650 rpm engine speed), 3,110 ft./min. in accordance with overseas standards (namely, 3,100 ± 100 fpm).

(4) *Power Take-Off*—

Centre read; clockwise; guarded.

Speed: at 1,550 rpm engine speed, 538 rpm, in accordance with overseas standards (namely, 536 ± 10 rpm).

Dimensions: 6 spline, 1⅜ in. diameter.

(5) *Drawbar*—Swinging—7 positions across.

Height, as tested 16½ in. not adjustable. Removal of swinging drawbar leaves fixed drawbar. Trailer hitch with quick release pin (height adjustable 26 in.-30 in.) and front towing hook (max. rating 1,200 lb.) also provided.

Linkage mounted drawbar optional extra.

(6) *Transmission*—Conventional gears.

Clutch: Double dry plate; main 13¾ in. dia., live drive 11 in. dia.

Gear ratios and road speeds (assuming no wheel slip) on 14 x 28 tyres, at rated engine speed, as advertised (see table).

(7) *Hydraulics*—Built in, 4-cyl. pump in final drive housing.

(8) *Three-Point Linkage*—Generally conforms to BS1841-1951, Category 2.

	Forward								Reverse	
Gear	1	2	3	4	5	6	7	8	L	H
Ratio*	360·0	187·6	108·4	87·5	63·3	45·8	26·4	15·4	360·0	87·5
Speed m.p.h.	0·73	1·4	2·4	3·0	4·2	5·8	10·0	17·2	0·73	3·0

* Includes Differential 3·13, Final drive 4·92.

G. H. VASSEY,
Officer in Charge Tractor Testing.
W. F. BAILLIE,
Tractor Testing Officer.

University of Melbourne,
30th September, 1960.

It's Marking Time

Many thousands of lambs will be marked this month! When marking, remember:—

1. **Marking time can be the beginning of blowfly control over the life of the sheep.**
2. **Give them a medium length tail, i.e., tail tip level with tip of vulva. This is VERY important.**
3. **Lambs can be mulesed and tailstripped during marking.**
4. **Mark lambs young—two-three weeks old.**
5. **Use the knife. Observe strict hygiene.**
6. **Mark in clean temporary yards in the paddocks.**
7. **Mark on a mild day—finish early in the day.**
8. **Leave a few well grown ram lambs entire and with long tails. Vasectomize them for use as teasers.**

A common docking fault is incorrect tail length. Most flocks are a mixture of short, medium, and long tails. This lack of correct and uniform tail length is more costly in terms of fly control than is generally realized.

The medium length tail with the cut tail-tip level with the vulva tip is the correct length for maximum protection. This length of tail significantly reduces moisture content (urine) in the crutch. The drying effect thus achieved makes the area less attractive to the fly. **The end result is much less crutch strike.**

Departmental officers are available to demonstrate and instruct any or all of the above techniques. Applications should be made to the Officer in Charge, Sheep and Wool Section, or to the local Adviser.

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Antibiotics and Sterilisers

IN THE DAIRY INDUSTRY

By K. NEEDHAM, B.Sc. (Agric.), and N. INGLETON, M.D.D., Dairy Division

AS a consequence of the rapid advances made in all aspects of technology there are an ever increasing number of preparations becoming available to the dairy farmer, to assist both in the control of disease in his crops, pastures and animals and to maintain and enhance the quality of his dairy products. These are—antibiotics, sterilisers, detergents, various weedicides and pesticides.

An examination of the antibiotics position suggests that it is following the same pattern in relation to animal health as has been the case in human administration of these drugs.

It has been known to microbiologists for a long time that bacteria have the ability to develop a resistance to a specific drug over a period of time and that, eventually, its usefulness may become limited, or restricted. As a consequence it becomes necessary for the technologists to either develop an entirely different practice or produce a new drug in order to control the ravages of the particular disease.

It may seem at first glance that the whole principle of the control of disease by means of the administration of antibiotics may ultimately become useless, and would thus develop into a race between bacteria and man in competition to produce resistant strain and new drugs. Fortunately the picture is not so gloomy.

The important factor is slowing up this race and maintaining the handicap in favour of man consists in the wise and discreet use of treatments. It would be quite possible because of geographical limitations and restrictions in the number of professional staff to confine the issue of antibiotics to a veterinary prescription. Hence they are more readily available in many cases than is desirable. If we consider, mastitis as a particular case, two situations appear to have arisen which are gaining momentum contemporaneously.

Because of the increasing resistance of the mastitis organisms to antibiotics, some dairy farmers are increasing the dosage. Because of the availability, they are tending to use them more frequently than may be necessary, in anticipation of trouble, rather than first having resort to preventive methods of cattle husbandry. Such standard procedures as the use of the strip cup, care and attention to detail of the mechanical efficiency of the milking machine, the practice of milking infected cows last should always be uppermost in the minds of the dairy farmers, and recourse should be made to treatment by therapeutic means only when these other methods have failed.

What then is the result of this mis-use of antibiotics? It has many repercussions. For the purpose of this article—we will look only at the effect on the cow and the quality of the resultant product.

From what has already been said there need be little elaboration of the ultimate effect upon a cow. The situation could quickly be reached where the casual organisms of mastitis had become so resistant to known antibiotics that their administration is likely to be almost useless. This position has not yet developed entirely, but there are signs of it being present amongst a proportion of the dairy

cattle population. Dairy farmers can stand to lose economically on two counts —the cost of unnecessarily high dosages of antibiotic and loss of production.

Speaking specifically of penicillin, it is well known that this is secreted and remains as a residue in milk or cream supplied to the dairy produce factory. It is not destroyed by heat or any of the manufacturing processes and remains active in the milk for periods of at least 72 hours after administration.

It has been ascertained quite conclusively that relatively small amounts of penicillin remaining in milk used for cheese manufacture can cause failure or serious reduction in the activity of the cheese starter.

Without being concerned about the various technicalities involved, the final result as far as the Dairy Industry is concerned is a reduction in quality. Any practice which reduces the quality of the final product will ultimately be reflected in the financial return to the individuals comprising the industry as a whole. Hence the recommendation which has always been made, that milk from cows treated with antibiotics should be withheld from sale for at least 72 hours after the last administration of antibiotics.

Detection of these antibiotic residues can be accomplished in a properly equipped laboratory, and in order that the Department should be adequately informed of the level of residual contamination in milk being supplied to dairy produce factories, a survey is currently in operation of individual farm supplies. This has already revealed levels of penicillin which would be harmful to quality. Apart from actually testing for the presence of penicillin, a rather more positive approach has been adopted in some other parts of the world, where a coloured marker dye is added to all penicillin before sale. This discolours the milk for a period of up to three days, and if the farmer should by forgetfulness overlook the need to hold his milk, he is adequately reminded of the necessity for doing so.

Dairy farmers, irrespective of the source of supply of their milk and its ultimate usage, should adhere to the requirement that milk from penicillin treated cows should not be supplied for sale unless 72 hours have elapsed from the time at which the last dose of antibiotic was given.

No discussion of the chemical residues of milk and their effect on quality would be complete without a reference to the effects of hypochlorite which is commonly used as a sterilising agent.

As with antibiotics, excessive use of hypochlorite can have indirect, but quite positive detrimental effects upon the quality of the factory product. It has been demonstrated that hypochlorite if used in too high a concentration can retard starter activity.

Having examined the situation quite briefly, it should be clearly understood that it is not the intention of this article to in any way deplore the use of these aids to better farm husbandry methods. Indeed our general level of husbandry, and the quality of our dairy produce may not have been expected to have progressed as far as it has, had it not been for the introduction of these aids.

The main point at issue is to draw to the attention of farmers the absolute necessity to utilise these substances strictly in accordance with the manufacturers' directions, and if they are in any doubt, to consult someone who can speak with experience and authority. Familiarity breeds contempt and we are often too prone to unconsciously become a little lax in the use of many items which become a daily part of our routine.

In some circumstances, this is not important, but in the case of the subject under discussion, abuse of these items can have serious and far reaching effects upon the economy of the industry.

IDENTICAL TWINS

A VALUABLE AID TO ANIMAL HUSBANDRY RESEARCH

AT a recent field day at Wokalup Research Station a set of identical twins was shown as being the start of a project to build up a herd or number of such, for research and extension work.

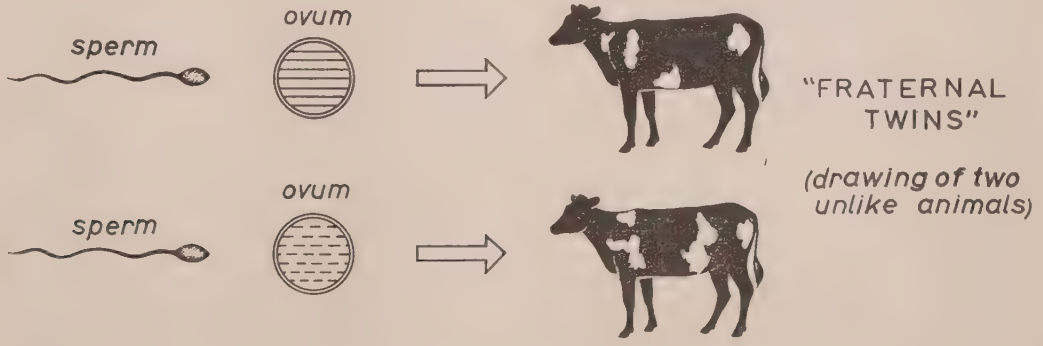
As such animals are relatively rare, the purpose of this article is to further bring to the notice of farmers the need for such animals, why they are, as has been stated —"Nature's Gift to Research"—and some of the ways in which they could be of great use in furthering our knowledge of animal husbandry in this State.

Their use for such purposes is not new by any means, and the first pair is reputed to have been recognised as such by an American Professor at a small County Show in the U.S.A. Closer to home a great amount of the credit for their use must go to Dr. McMeekin who during a visit to Sweden in 1936 saw the start experimentation using identical twins, and rapidly and very successfully adopted similar methods at the famous Ruakura Research Station, New Zealand.

Since that time all the major dairying countries have done the same thing in their research programmes, to study the effects of their own particular practices, feeding methods and environment.

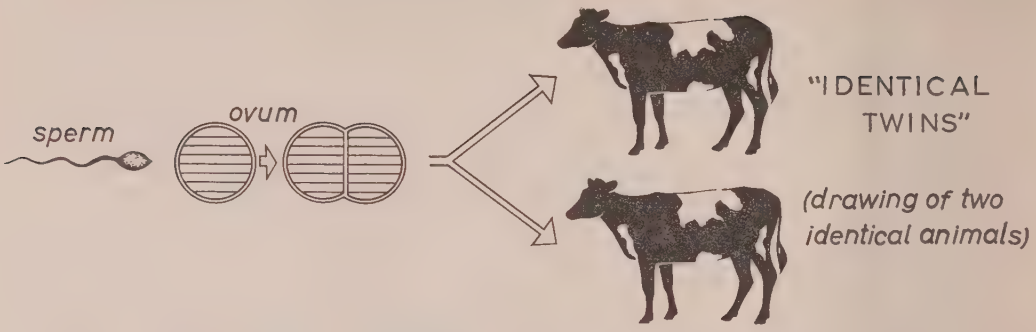
In the past we have had to rely to some extent on this information, but it is now time we produced information particular to this State alone, for we have a distinct set of environmental features found in the same combination in no other dairying country nor in any State in the Commonwealth.

Some work has already been done and widely followed—that at Bramley Research Station on phosphate supplements for dairy cows, but this is only the start; there are a variety of pressing problems yet to be tackled.



Twins so produced may be of the same sex or different and are no more alike than are ordinary brothers and sisters.

To produce identicals, however, this takes place:—



WHAT ARE IDENTICAL TWINS

Probably many people think they know what identical twins are but when it comes down to the reason why they are, and what actually happens to produce them, they are not so sure. In order to better understand their unique value, let us consider what actually happens to produce the phenomenon.

At the moment of ordinary conception one male sperm unites with one female ovum or egg to produce one animal, or as illustrated two sperms and two eggs may unite separately at the one time.

The single egg after fertilisation splits into two halves each carrying identical factors or chromosomes as represented graphically.

FREQUENCY

Now, whilst with ordinary twinning, heredity does have an influence, the occurrence of identicals is stated to be one of pure chance only. Thus they don't occur very often; one expert estimates the number is in the region of one set in every thousands or so births. With our relatively small cattle population, then it will call for continued close co-operation between the farmer and the Department of Agriculture, if a reasonable number of these valuable animals is to be built up.

THEIR VALUE FOR RESEARCH

Identical twins as now will be recognised are the exact genetic copies of one another, that is each carries a set of identical factors for each and every characteristic of its whole make-up. Just imagine what this means to the research worker—at one stroke, so to speak, the great "bug-bear" of animal work—variability between individuals, is removed. For example take a simple comparative study say feeding silage as against good quality hay. It would be quite impossible to carry out this work using just two ordinary cows when we already know that great differences in production can occur between the same two animals when both are fed on one of these fodders alone.

To partially overcome this, it is necessary therefore to use larger numbers of animals, grade them as far as possible by weight, age, etc., and then divide them into experimental groups. Even so, the experimenter can never be certain that he has done a good job of the grading and his results must always be suspect.

The first table will illustrate the extreme variability that can exist in dairy cows:—

Table 1
(LB. BUTTERFAT)

Age of Animal	Production of Butterfat from Individual Animals
Mature Cows	380, 148, 295, 376, 321, 351, 306 278, 239, 311, 402, 244, 286, 333
Three year olds	184, 300, 204, 326, 223, 290
Two year olds	323, 216, 176, 208, 193, 311

These are all in the same herd and of one breed.

UNIFORMITY OF IDENTICAL TWINS

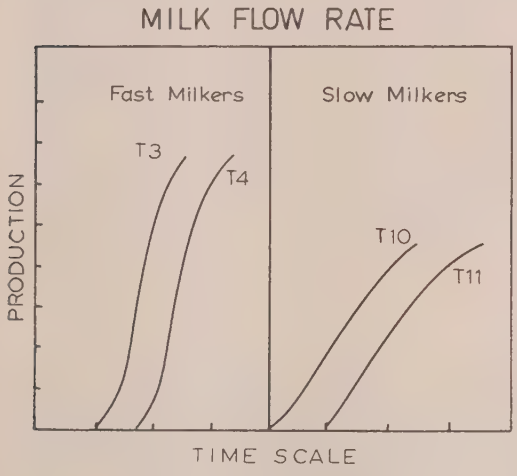
Work done in many parts of the world has clearly illustrated the amazing similarity in behaviour of twins when run together. This is evident in most of the important economic characteristics such as butterfat and milk production, beef weights, growth rates and so on. Figures

from Ruakura show this in the eight sets of twins run together as one herd.

Table:
(LB. BUTTERFAT)

T1	....	....	 266	T3	....	....	 240
T2	....	....	 280	T4	....	....	 248
T11	....	....	 222	T13	....	....	 212
T12	....	....	 216	T14	....	....	 211
T17	....	....	 323	T23	....	....	 11
T18	....	....	 313	T24	....	....	 5
T27	....	....	 216	T29	....	....	 242
T28	....	....	 221	T30	....	....	 245

Similarly as shown in the graph below they are even alike in such things as milk flow rate.



USES OF TWINS

Because identical twins are really duplicates of one another it is possible to disintangle inherited and environmental effects one from the other. Differences between numbers of the same set measure environmental factors alone whereas differences between actual sets on the other hand reflect inherited as well as environmental differences.

They are particularly important in illustrating to the farmer the great differences that can be obtained by environmental factors alone such as feeding, management, etc., without even starting on the breeding angle.

For instance, twins have been split between farms with records of different levels of production per cow. The results have shown quite clearly the enormous value of feeding and management, and showing furthermore how important it is to judge a cow's performance in the herd rather than between herds. A 281 lb. cow in a herd averaging 302 lb. of fat can be essentially the same cow which produced 178 lb. in a herd averaging 205 lb. of fat

These then and others are studies that can be carried out here:—

Calf rearing and feeding
Grazing management
Nutritional value of our pastures
Milking methods

just to mention a few. They will add considerably to our knowledge of dairy cattle husbandry in this State in ways that should help to produce better animals as time goes on.

IDENTIFICATION

If we are to obtain sufficient animals it will mean, with our smaller numbers that all like sexed twins should be treated as of the right potential and examined carefully.

The following are a few points for assistance in this, and should at least help decide whether there is a strong possibility of the twins being identical. At this stage the nearest District Agricultural Adviser should be notified so that he can make a closer check and arrange a probable sale if they prove to be such.

The first clue then, may be that they are of the same sex, or better still, should the farmer actually be present at the birth, identical twins are born together incased in the same birth sac. He is not usually there at the precise moment however, so we have to use other methods of identification.

To the expert there are many features that can be used in the judgment, but only the most important ones will be considered here and in fact these alone can decide the issue in nearly all cases. They are mentioned in order of importance.

(1) **Hair Colour.**

The colour of the hair is a very strongly inherited characteristic indeed and influenced to only a minute degree by environment. Whilst it is an almost infallible criterion in older animals, in calves the adult hair colour is often obscured by the birth coat and this may make positive identification a little more

difficult. However, this can be largely overcome by running the hand against the lie of the hair in a good light at various parts of the body and observing colour differences.

It must be stressed though that white markings, apart from a general similarity only, need not be exactly alike in position and extent.

(2) Size and Shape of Head.

The head is another very good means of definite comparison especially when the animals are held so that close examination is possible. The most positive features are the overall size and shape of the head, circumference and shape of the muzzle and length width and pigmentation of the lower jaw. In general, even small differences in head form are a strong indication that the twins are not identical.

Less positive features are curvature of the forehead, height of eye arches, set and size of the ears.

(3) Body Conformation.

Fairly large differences in body weight can occur between new born one egg twins due to body fat or muscular development, and this can lead to a difference in actual size.

However, it can be stated that two calves of different size which show similar body proportions, will seem more alike under close observation, than two other calves of the same size but different body proportions. This is the basis of judgment when members of a set differ appreciably in size.

(4) Colour of Eyelashes.

Hair colour as has been stated is very strongly inherited and the colour of some hair growth such as eye lashes, ear fringes and tail swish not being obscured by birth coat are particularly useful. It is often possible to discard a set of new born twins as non identical by examination of the eyelashes only.

(5) Ear Pigmentation.

Jersey and Jersey cross cattle in particular often have pigmented streaks on the skin inside the ears covering varying proportions of the lower part. These too can be a deciding factor when coat colour is difficult to assess.

TYPICAL EAR PATTERNS
(after Hancock)

(6) **Length of Tail.**

Whilst the brush of the tail may vary slightly in colour due to presence of white hair, length of the tail is a fairly strong point to watch for.

Above all, when making an examination it is advisable to look for points of difference rather than those of similarity, for even non related calves have many features in common.

Finally it is repeated that the value to the farming community of animals such as these cannot be over emphasised and and it behoves all whose herds are so blessed to assist by bringing them forward for such work as has been rather briefly outlined. The results and findings could well be of great benefit to the W.A. Dairy Cattle Industry and perhaps the beef industry also.

FARMERS

This is YOUR Journal, and it has been written, edited and presented in a sincere endeavour to give you helpful information in an interesting manner.

We would like to have your views on the Journal—to know whether you like it or whether you don't. Drop a line to the editor and tell him the features you like and don't like in this issue—or the features you hope to see in future issues.

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SARCOPTIC MANGE OF PIGS

By H. D. SEDDON, B.V.Sc., and F. C. WILKINSON, B.V.Sc. (Animal Division)

THIS parasitic disease appears to be much more common than is usually recognised; for, while severe cases with chronic skin lesions are readily seen, light infestations, especially on coloured pigs often go unnoticed. When it is realised that even lightly infested pigs require twice as much feed to make one pound gain in live weight as do uninfested pigs, then early recognition and treatment of the disease becomes an obvious economical necessity.

CAUSE AND SPREAD

The disease is the result of the pig mange mite (*Sarcoptes scabiei*, var. suis), which spends its entire life cycle on its host, obtaining its food requirements from blood and skin tissue. The adult mite is too small to be visible to the naked eye, although the raised lumps it produces as a result of its burrowing into the deeper layers of the skin are readily seen.

Its short life cycle allows for a rapid increase in the number of parasites on the host. The period for an egg to hatch and reach maturity is usually 14 or 15 days, but may be as short as ten days under favourable conditions. Thus, in the space of six weeks, large areas of the body surface of the pig may become involved.

An infestation usually begins through contact of the herd with infested, introduced animals and is followed by rapid spread from pig to pig by contact. The rate of spread is more rapid in pigs housed in close quarters and in litters suckling infested sows, the piglets showing symptoms at about the weaning age of 6 to 8 weeks.

Although the mite cannot multiply away from its host, it or its eggs can survive for up to one month in pens, yards and bedding, providing conditions are moist and it is not exposed to sunlight. This is a point of importance in control of the disease after treatment, as pigs can be reinfested from the premises.

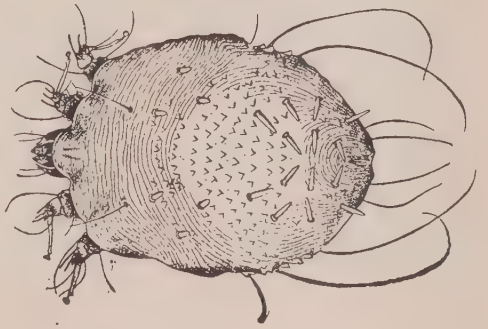

Fig. 1.—The mange mite of the pig, magnified 100 times.

SYMPTOMS

The predominant symptom is intense itching, due to the injury and irritation that the female mites produce as they burrow into the skin laying eggs. Early in light infestations on young pigs, small red nodules can be seen studding the affected areas around the snout, eyes, ears and any other place where the skin is tender and the hair thin. In older pigs, the lesions frequently occur around the ears, tail, the inside of the legs, groin and armpits, but are generally milder and in coloured pigs, may go unnoticed.

The irritation causes affected pigs to rub continuously against posts, feed troughs and fences and to scratch at their bodies with the hind feet. As a result of this, the areas become denuded of hair, and the skin becomes thickened and scaly, scratched

and mutilated, spoiling the appearance of the dressed carcase. In advanced and long-standing cases in young pigs, the crusty skin forming around the raised nodules results in a thickened, wrinkled skin which may crack, ooze blood and serum, and develop an offensive smell.

The severe and constant irritation slows down the normal growth of young pigs and they become stunted and unthrifty. Older animals, in which fattening is delayed, take considerably longer to reach a marketable weight. Severe cases, especially in younger pigs, occasionally end in death.

Fig. 2.—A young pig showing advanced symptoms of sarcoptic mange. —(After Hutyra & Marek.)

DIAGNOSIS

Diagnosis is based on symptoms of intense itching, causing the pigs to rub themselves, associated with a scaly skin showing raised lumps indicating the entrance to the female mite's burrow.

Skin irritation may result from other causes. Lice, if present, cause considerable irritation with frequent rubbing and scratching; but on account of their large size are easily visible behind the ears, along the backline and on the sides. Moreover, the itching they produce is much less severe, and does not result in thickening or wrinkling of the skin.

Sunburn is a dermatitis caused by the ultra-violet wave lengths of sunlight, but is mainly seen in young, white-skinned pigs which have not been acclimatised to the sun by graded exposure. Although initial symptoms of intense pain and reddened skin could not be confused with sarcoptic mange, the subsequent thickening of the skin, especially around the ears, is similar. However, sunburned pigs do not show the intense itching nor the raised skin lumps seen in mite infestation, and usually the burning has previously been noticed.

TREATMENT AND CONTROL

Control of the disease should consist of a programme of treatment of all pigs on the property with the aim of complete eradication, after which precautions should be taken against re-introduction of the disease.

Treatment itself is best preceded by a reduction in the number of pigs to be treated by selling all marketable pigs, and those old boars and sows no longer required. The badly affected pigs which are in poor condition should be destroyed as they make unsatisfactory growth after such a serious set-back. All pigs on the property including those which are apparently unaffected should be treated three times at intervals of ten days to completely eliminate all hatching mites before they have an opportunity to lay eggs.

The more recently introduced insecticides give best results and can be conveniently applied by means of a hand-spray. The use of a 0.25% suspension of benzene hexachloride (BHC, gamma isomer) in water or oil, or a 0.25% emulsion of chlordane will generally end irritation and rubbing within twenty-four hours, with the lesions disappearing in 2 or 3 weeks following a single treatment. These can be applied by crowding the animals into a crate and spraying from both above and

below. In this way, the movement of the pigs aids in getting a good cover and in working the medicament into the skin.

However, at least two treatments at 10-day intervals are still advised. Removing dirt and thickened skin from the affected pigs' bodies prior to spraying will also assist penetration of the medicament. It should be noticed that the strength of benzene hexachloride (BHC) recommended for sarcoptic mange is five times that to be used in the treatment of pig lice where only 0.05% solution is necessary. Spraying with benzene hexachloride within 2 or 3 weeks of slaughter is not advised, as the meat may be tainted.

The older methods of treatment such as dipping in crude oil, sump oil, or lime sulphur are not considered to be as efficient as benzene hexachloride.

After treatment, the pigs should be transferred to clean quarters which have not been occupied for at least one month, or else returned to their original quarters after these have been cleaned out. In either case all bedding and litter should be gathered together and burnt with the destroyed pigs, and the pens hosed out. The walls and floors should be sprayed with a 5% solution of lysol (8 oz. of lysol to 1 gallon of water), or with the 0.25% benzene hexachloride solution used in treatment, if the quarters are to be re-occupied. This will destroy those mange mites which remain on the premises, and would survive apart from their host for several weeks, presenting a source of re-infestation.

Once eradicated, precautions should be taken against re-infestation, by subjecting all newly purchased pigs to no less than two treatments 10 days apart during a standard three-week isolation period. This isolation period should be a routine procedure on pig properties to prevent introduction into the herd through newly acquired animals, not only of sarcoptic mange but also of the many other contagious and infectious diseases.

HOW MUCH DOES IT HOLD?

The familiar 4-gallon kerosene-tin and the quart dipper are widely used on farms as feed-measuring containers.

Even better use can be made of them when the weights of various feedstuffs are known. These weights are given below.

KEROSENE-TIN

A kerosene-tin (4 gallons) of:—

	Weighs lb.		Weighs lb.
Wheat (whole)	30	Oats	20
Wheat meal	22	Crushed oats	13
Barley	25	Pollard	18
Barley meal	20	Meat meal	30
Maize	28	Blood meal	35
Maize meal	25	Lucerne meal	10
Grain sorghum	30	Linseed meal	30
Grain sorghum meal	25	Peanut meal	25

With a rule, measure off the kerosene-tin into gallons.
Mark these levels, in paint, on all four sides of the inside of the tin.

QUART DIPPER

The quart dipper is widely used to measure these items in the ration that are used in small amounts.

For instance, 1 quart of salt weighs 3 lb.; of bone meal 2 lb.; and of ground limestone 4 lb.

To find the weight of a quart dipper of any of the items mentioned in the first column, divide the 4-gallon tin weight by sixteen (16).

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THE FEEDING OF PIGS IN THE WHEATBELT

By S. R. DUNSTAN, Technician, Dairy Division

ONE of the biggest costs in pig-meat production is feeding, and it is of vital importance for the farmer to understand what presents a balanced and economic ration, in order that he can take steps to achieve maximum efficiency.

The most common feeding problems associated with pig raising in the wheatbelt are:—

(1) A lack of protein.
(2) Little or no greenfeed or vitamin A.
(3) Deficiency of minerals.
(4) Either too much or too little fibre.
(5) Usually poor quality and supply of water.

PROTEINS

Protein, the meat forming and body building component of the diet, is essential for pigs of all ages, but especially for growing animals, or sows which are lactating or in-pig. Protein can be obtained from 2 sources—

(a) **Animal origin,** such as from meatmeal, whalemeal, cooked animal carcases, or skim milk.
(b) **Vegetable origin,** such as from grass, cereal grain, lucerne meal or linseed meal.

Nutritional experiments have demonstrated that vegetable protein is insufficient alone, and that animal proteins, because of their content of the animal protein factor, must be included for the well being of pigs.

A common mistake in the wheatbelt is the use of cereals alone for the diet of pigs. Apart from the fact that grains contain only vegetable protein, the total protein (approx. 10 per cent.) is too low, consequently the addition of meatmeal or another protein supplement is essential. Unless the lack of protein in the grains is rectified the growth of the pig will be slow, more food will be consumed per pound of liveweight gain, and the carcase quality will also suffer because of insufficient lean meat and too much fat.

Young pigs require a high proportion of protein in the diet, and nature allows for this by providing milk, which has about 30 per cent. protein on a dry matter basis. For maximum growth however, this is insufficient and a creepfeed should be available from about the second week of age, until the piglets are weaned on about the 56th day. Creepfeed should be available particularly when the sow is having her first litter, or when she is a poor milker. When the sow has a large litter, creepfeed also helps to prevent the "milking off" of the sow's condition.

EARLY WEANING TECHNIQUE

There have been many successes with early weaning under commercial conditions, but it is appropriate to sound a word of warning. This technique depends for its success on a high standard of hygiene and management in the piggery, and considerable observation and attention to the details of cleanliness. The farmer who can effectively early-wean his pigs is rewarded by obtaining litters more frequently than with weaning at 56 days, and the sow's reserves are not exhausted to the same extent when she has the shorter lactation. Rather than dry off the sow completely during the second or fourth week of lactation it has been found desirable to gradually wean the piglets by

restricting their access to the sow for 12 hours per day, while at the same time the piglets are encouraged to consume the sow-milk substitute.

The starter creepfeed must have 4 important characteristics to be successful:—

(1) **Palatability.**—Usually cane sugar is added to improve this.

(2) **Texture.**—Research in U.S.A. and elswhere has shown that rolled oats improve the feed by making it more attractive to the piglets.

(3) **Freshness.** — Renew frequently—Give the old feed to the sow.

(4) **Protein.**—A high level of the body building component is essential, and each mouthful of the feed must be useful at this stage.

A typical starter creep can be made up as follows:—

	%
Skimmilk powder	45
Crushed wheat	20
Rolled oats	15
Meatmeal (55% protein)	10
Cane sugar	10
	100

Plus 0.5% salt.

If the piglets are showing signs of scouring an antibiotic should be included.

After a few days when the piglets have been broken into this feed, a cheaper mixture can be used until weaning on about the 28th day.

This creepfeed is made up as follows:—

	%
Skimmilk powder	28
Crushed wheat	60
Meatmeal	12
	100

Salt is added at the rate of ½ per cent.

PIGLET ANAEMIA—IRON DEFICIENCY IN PIGLETS

Piglet anaemia is caused by a deficiency in the diet of the essential element, iron. Both sow's and cow's milk are deficient in iron and copper, regardless of the standard of nutrition. As this is frequently the only food that the piglets have for some time, anaemia deficiencies often occur. The easiest way to ensure that the piglets have their requirements of iron is to place a shovelful of clean earth in the farrowing pen each day, or alternatively allow them to have access to clean grazing. On no account should the piglets be allowed access to land which had become pigsick due to a build up of worm eggs and other disease causing organisms. Other methods of supplying iron and copper are by injections, or by placing small amounts of these elements on the tongues of the piglets.

GRAINS

Wheat, oats and barley are mainly considered as the carbohydrate portion of the diet, although they do contain on an average approximately 10 per cent. of vegetable protein.

Pigs below 100 lb. liveweight require a diet with a low fibre content, otherwise growth will be slow and they may appear to be in poor condition. Oats which has a fibre content of 10-12 per cent. should not exceed 30 per cent. of the diet for pigs of this age, although barley (5-6 per cent. fibre) and wheat (2-3 per cent. fibre) can be used for a large proportion, or the whole of the grain ration because of their lower fibre content.

Baconers and breeding stock may benefit from a higher proportion of fibre, and up to 75 per cent. oats can be used because it keeps the animals contented without contributing to over-fatness.

The proportion of wheat, barley and oats in the ration is affected by the relative prices and the quantities available. At the present time barley, if available, is the cheapest feed in many localities.

A formula to compare the relative economics of feeding the various grains is as follows:—

Divide cost of 50 lb. bushel of barley by 36.

Divide cost of 60 lb. bushel of wheat by 43.

Divide cost of 40 lb. bushel of oats by 24.

Divide cost of 20 lb. bushel of pollard by 14.

The lowest figure obtained by these divisions is the cheapest feed. This formula takes into account the different bushel weights and nutrient values of the grains.

As the pig grows, less emphasis is placed on the body building portion of the diet, and the protein content of the diet can be gradually reduced from 18 per cent. or more for the suckers, down to about 13 per cent. when in the baconer stage.

This is achieved by maintaining the meatmeal (or alternative) at ½ lb. per head daily from 8 weeks of age until the baconer stage, but the grain portion is gradually increased.

As a general guide, pigs will consume up to 1 pound of grain for each month of age, providing they are kept in good health. At the baconer stage, no more than 6 lb. of grain should be fed daily.

MINERAL SUPPLEMENTS

Although high in phosphorus content, grains are low in calcium content, therefore when little or no milk product is supplied, such as under wheatbelt conditions, it is recommended that 1 lb. of limestone fines be added to 100 lb. of grain. In addition, ½ lb. of common salt should be included, providing the water supply does not have more than 100 grains of salt per gallon.

Other elements such as copper and zinc may be supplied by topdressing the paddocks with copper-zinc-superphosphate, usually once every 5 years. It is preferable to have open range conditions rather than pig sties because under the latter, copper deficiency is more common.

There are few other mineral deficiencies which pig farmers in the wheatbelt have to contend with, thus many of the propriety lines of "shotgun" mineral mixtures are not recommended excepting for animals which are purchased from sources where the previous feeding history is unknown.

PROTEIN SUPPLEMENTS

As this is one of the most important and the most expensive portion of the feed, special care should be taken in the selection of purchased supplements.

Meatmeal, although showing a slightly greater variability in quality and composition than the other protein supplements, is the cheapest per protein unit. It is closely followed in cost by whalemeal, and then linseed meal. The present economics of pig raising permits the use of only meatmeal, whalemeal or similar products, as protein supplements, excepting when skimmilk powder may be used as a milk substitute in starter creep-feeds.

Cooked carcases of cull ewes, cows, or rabbits may be used as a substitute for meatmeal.

4 lb. cooked carcase = 1 lb. meatmeal.

Lucerne meal is generally too expensive to buy for pig feeding, and excepting under the most favourable conditions it is unlikely that it would be economic for wheat farmers to grow lucerne for conversion into lucerne meal. When available lucerne meal should be used in a very small proportion for growing pigs, because of its high (30 per cent.) fibre content, but sows can take up to 50 per cent. of it in the diet. Lucerne meal contains approximately 16 per cent. protein, and being of vegetable origin, other protein of animal origin is also necessary in the diet of pigs.

Green grazing is one of the cheapest feeds, but as the majority of piggeries do not have the open range system of pig raising, little use is made of this method. Green feed is a valuable source of minerals and vitamins, especially vitamin A, which is particularly essential for pregnant sows, and growing pigs. If there is little or no greenfeed available it is essential to provide vitamin A in the feed by means of small quantities of fish oils

Grazing under the Open Range system. Green feed supplies protein, minerals and vitamins especially vitamin A

To prevent "bullying" at feeding time the feed should be well spread out in long troughs

An open range trough feeding system which helps to prevent excessive sand from contaminating the feed

or other proprietary lines. During the winter and spring period when there is adequate grazing available it can replace up to one half of the meatmeal requirements of pigs over the weaner stage, so at least for a portion of the year there can be considerable saving in feeding costs.

FEEDING GUIDE

The following shows the approximate requirements of food per pig each day, when either meatmeal, whalemeal or separated milk are given as protein supplements (1½ gal. of separated milk = 1 lb. of 50-55 per cent. protein meatmeal.)

Note.—If good quality grazing is available, the meatmeal requirements can be reduced by up to 50 per cent.

Age and Classifications	Approximate Liveweight	Protein Supplement			Overall Protein
		Separated Milk	Meatmeal or equivalent 55 per cent. Protein	Crushed Wheat or equivalent	
	lb.			lb.	Per cent.
6–8 weeks sucker	6–40	Creep self feeder ration			18
8–10 weeks weaner-slip	40–50	¾	½	1–2	18
10–14 weeks grower	50–80	¾	½	2–3	16
14–18 weeks light porker	80–110	¾	½	3–4	15
18–22 weeks heavy porker	110–140	¾	½	4–5	14
22–28 weeks light and medium baconer	140–200				13
heavy baconer	200 Plus	¾	½	6–6½	
In pig sows and boars	200 Plus	1½–2¼	1–1½	6–9	16
Sows and Litters	250 Plus	3–4½	2–3	8–12	18

OVERFAT PIGS

Frequently pigs from the wheatbelt are received at the factory in overfat conditions. This occurs especially during the periods of seasonal operations, when due to the pressure of work the farmer is delayed in marketing his pigs. This results in pigs which go past their marketing prime, and generally the extra increase in weight is made up almost entirely from fat. Pigs should be marketed at lower weights during these periods, so that the quality is at least maintained. Pigs which have access to self feeders are also subject to overfatness, and should be marketed 2 or 3 weeks earlier than otherwise.

HEALTH IN RELATION TO FEED CONVERSION AND GROWTH RATES

Pigs which are raised under filthy and unhygienic conditions are invariably unthrifty and a source of loss to the farmers. One of the most sanitary piggery layouts is the "Open Range System." Each sow and her progeny are allowed preferably no less than 1 acre, thus permitting a

Pigs under the Open Range system. This is a cheap and sanitary method of pig raising provided resting, rotation and periodical cropping of the land is practised

rotation of 4 weeks or longer and cropping and resting of the paddocks every second or third year. This programme helps to reduce the incidence of "pig sick" land, caused by a build up of worm eggs and disease causing organisms.

The farmer should aim to produce as many of his own growing stock and breeding replacements as is practicable. Weaners and store pigs from sales are a common means of introducing disease and worms into the piggery.

To prevent the introduction of disease into the piggery, all the purchased animals should be isolated from other pigs, for a period of about one month. It should also be a standard practice on the piggery to deworm all weaners and also sows, prior to farrowing.

Cooling facilities are essential for pigs during hot weather if a good conversion rate is to be expected. Bush shades are cheap but effective

During the summer months, cooling facilities and a good supply of water are an insurance against deaths, and also against the more common problem of reduction in growth rate. When pigs are hot they lose their appetites, they eat less, and thereby put on weight much slower than they would otherwise. If possible a portable or permanent shade house should be provided for each group of pigs, and if trees are used for shade, they must be protected from ringbarking by surrounding them with barbed wire.

During the winter further precautions should be taken against losses by supplying dry sleeping quarters free from draughts.

WATER SUPPLY

The quantity of water needed for pigs varies according to a number of factors, the chief being the type of feed being used, the season, the liveweight of the pigs, and the condition of the sow. Lactating sows need much more water than dry sows, and frequently a restriction in supplies is responsible for poor milk supplies. Some growers force their pigs to drink too much water because they mix big quantities with the feed, and this is liable to be detrimental to the growth rate. It is preferable to have water freely available rather than mix it with the feed.

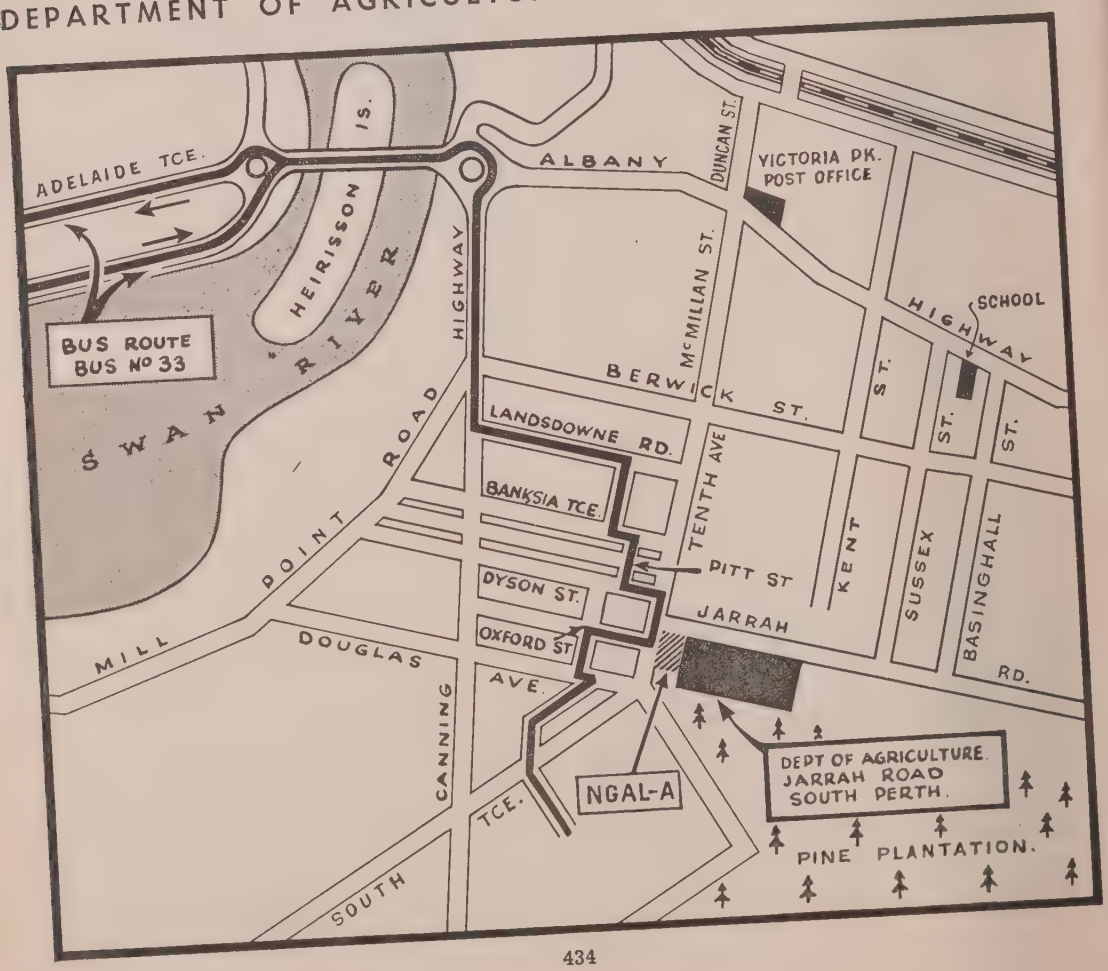
A lack of water may be responsible for inefficient feed conversion rates, and during the summer a severe shortage is often fatal. Sometimes an unshaded water bowl or hot, salty water stops the pigs from drinking. It is wise to guard against a high salt content in the water as pigs have a much lower tolerance than sheep or cattle. If the water has more than 100 grains of salt per gallon it is not necessary to add salt to the feed, and water exceeding 200 grains per gallon should be used for short periods only.

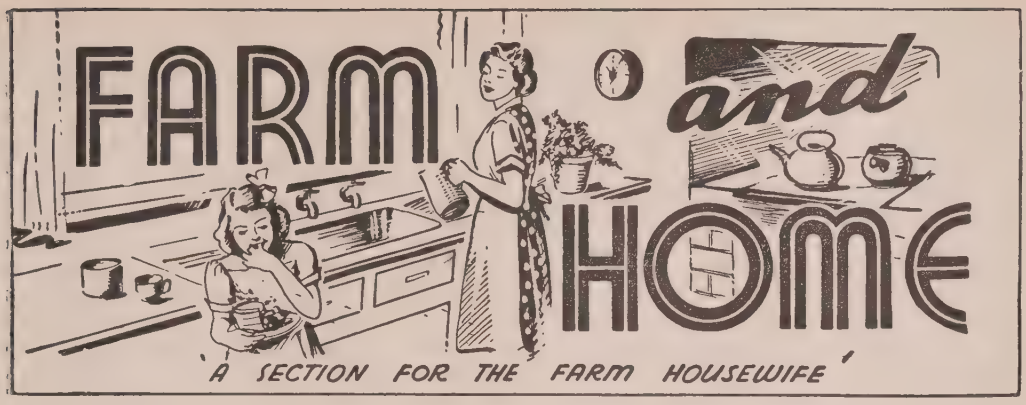
Taken over a whole piggery including breeding sows, boars, growing pigs, etc., it is essential that at least 1 gallon of water per head is supplied daily. The water should be clean and free from pollution, and drinking from muddy holes and dirty wallows should be discouraged.

CONCLUSIONS

A correct understanding of feeding practices is essential for the modern grower, if he is to produce pig meat at the most economical price. To achieve success a balanced diet must be provided in association with adequate sanitation, good husbandry, proper housing and sensible precautions against disease. Under good conditions a feed conversion rate of 3 lb. of feed for 1 pound of the liveweight can be achieved without the additions of antibiotics or other growth promoting agents.

DEPARTMENT OF AGRICULTURE – HOW TO GET THERE





Getting the Best from Your Sewing Machine

By O. EVANS

"NEXT to the plough, this is perhaps humanity's most blessed instrument." (Louis Antoine Godey.)

In some homes the sewing machine is the most sadly neglected and ill-used servant. It is often left set up, exposed to dust, dampness and scratching, used as a table and otherwise abused. It is not right to have a machine stitching imperfectly and noisily and used for long periods without maintenance when a little attention can keep it performing quietly and efficiently.

GENERAL CARE OF MACHINE

A sewing machine is a very valuable article, worth the best possible care. Make a well-fitting, firm cotton cover to protect the cabinet. Never put heavy weights on the machine nor allow children to sit, or lean on it. Polish the woodwork with a good furniture cream and clean the iron framework occasionally.

Dust the machine before using and before putting away—put it down and cover it when not in use. To prevent deterioration of both woodwork and metal parts, keep machine away from strong heat and sunlight and moist air. Do not leave it near an open window.

If yours is an electric machine, coil cords loosely when putting it away. Keep foot control clean to prevent short-circuiting through dust. When not sewing, turn main switch off. Take care that the cord is not near the belt—it is possible for the belt to cut into the flex leaving bare wires showing.

USING THE MACHINE

To familiarise yourself with your machine, study the details in the instruction booklet. Follow the threading diagram for your type of machine, paying particular attention to threading *between* the tension discs. (It is easy to have the thread either behind or in front of the two discs instead of between them. It appears correctly threaded but will not stitch correctly). Have the takeup lever (the moveable hook above the needle) at its highest point when threading—if not it will take up extra cotton when rising and become unthreaded—and when removing work—if not it will be hard to draw work away and three threads will be seen coming through the needle hole. Thread the needle from the grooved side (which can be felt with a fingernail). With a treadle machine, make sure that the belt is on before threading otherwise tangling may result. Set the bobbin in place and after drawing up the loop of thread from underneath, place both

threads back between the division of the foot. The reel and bobbin threads should be the same thickness to ensure even stitching. Lower the presser-foot *gently* on to the material—start and stop stitching in the material.

Use the built-in thread cutter behind the needle. It is not wise to take scissors to the machine as they will scratch and chip the surface, or if left on the lap can be forgotten and on rising can fall and cause a nasty wound.

Avoid leaving pins in sewing, particularly on the underneath, as they can break or blunt the needle and scratch the machine. (Knots in tacking cotton can also break the needle). Stitch slowly over thick parts, helping the machine by turning the wheel by hand, to avoid damaging the needle.

Before stitching, check the threading of the machine and see that the needle is straight and sharp and that it and the presser-foot are tight. (Sometimes the thumb-screws become loose and the needle can come out and/or be broken on the presser-foot). A blunt needle splits the threads of the fabric and causes puckering—it is best discarded. Test the stitching on a doubled scrap of the same material before stitching on the garment.

Guide work through but do not push or pull as this results in an uneven tension and stitch. Keep the bulk of the material on the left-hand side of the machine. If there is a small light globe on the front avoid this as it becomes quite hot and can burn. In the case of delicate fabrics it can scorch, and with nylon even melt!

TENSION AND STITCH SIZE

These are two entirely different things, not to be confused one with the other. Tension is the pull or strain on the thread, necessary on both reel and bobbin thread to correctly form the stitch. Stitch size is merely the *length* of the stitch—the numbers at the side of the machine-head mean that each stitch is that fraction of an inch in length.

The bobbin tension is set in the factory and should not need much alteration. The tension on the reel thread needs adjusting each time a different thickness of thread and fabric is used. Detailed instructions and diagrams are in the instruction book for the machine. As a general rule, use a size 14 needle, 40 gauge cotton and about 12 stitches to the inch for normal household and family sewing. For very fine materials, change to a size 11 needle, 50 gauge cotton and 15 to 20 stitches to the inch. When sewing on thick materials put in a stronger size 16 needle, use 36 gauge cotton and only 8 or 10 stitches to the inch. The thicker materials will need a looser tension, and the finer materials may need a slightly tighter tension—test on scraps and adjust until the stitch is the same in appearance on both sides of the fabric.

THE ATTACHMENTS

In many machine drawers the attachments that came with the machine lie as yet untried still in their original wrapping. Next time you have a spare half hour, try some of them—you will probably be pleasantly surprised at what they can do. They are very easily attached and can save a lot of time particularly when hemming sheets and tablecloths and gathering skirts, frills, etc.

CLEANING AND OILING THE MACHINE

Regular maintenance is essential to keep the machine working quietly and efficiently with a minimum of wear. Remove all dust and fluff before oiling—clogged dust and oil can cause faults in stitching and increase wear. Use a soft camel hair brush when dusting into bobbin well. In particular, keep the bobbin case free from dust and fluff and well oiled—this is the hardest working part of the machine. Apply a drop of oil to all contacting moving parts and do not forget the wheels and treadle of the treadle type machine. See your instruction book for details.

Many an old machine thought to be useless has responded like magic to a thorough cleaning and oiling. If a machine has been very badly neglected, clean thoroughly then oil with paraffin and run rapidly, then wipe off the paraffin and oil with the recommended machine oil. Kerosene may be used first to help clean an old, unused machine, but wipe it away thoroughly as it may promote rusting.

MENDING WORKING CLOTHES

The following is in response to a reader's queries on this subject.

Trouser Hems.

As trouser cuffs on work clothes have only a nuisance value as sand and seed carriers they are best abolished! For work clothes the hem should be just above the ankle level so that it does not rub and wear against the top of the boot. When new, undo cuff if any and adjust the hem level, then attach a small leather protector inside the back and front where most wear occurs. (These protectors can be bought in chain stores, or half-inch strips can be cut from old kid gloves or slippers. Strips of felt could also be sewn on.)

To repair a worn hem that is the right length (i.e. if there is not enough to turn up to form a hem) trim the frayed edge then face it back invisibly using a three inch wide straight or bias strip of a similar material. Place right sides together and machine around half an inch from the edge, then turn facing to wrong side and hem or machine in place. Sew on a protecting felt or leather strip as above.

Darning.

For work clothes, machine darning gives a much stronger repair in much less time than hand-darning. Most machines have a reverse lever which can be stitched backwards or forwards and makes machine darning very quick and easy. Start half an inch from the left-hand side of the tear and gently pull the work sideways with the left hand while operating the lever with the right hand. Stitch both vertically and horizontally, along the *straight* grains, as puckering may result on the cross of the material. This is very handy for mending those little holes caused by barbed-wire fences. Long tears should be fishboned together by hand before machine darning. Continue the darning for at least half an inch past the tear in each direction.

Patching.

The knees of trousers are difficult to get at for machine mending, and it is worthwhile undoing a leg seam to enable the leg to be placed flat. Catch the edges of large tears by hand, then put patch on the right side. Make knee patches quite large to cover the thigh and skin area, and stitch across the patch diagonally to hold it flat against the leg.

When patched knees of trousers or overalls are wearing thin, another suggestion to prolong their life is to cut the legs off half an inch below the crutch seam and interchange them so that the firm parts at the back of the knees are placed to the front. Be sure to cut both exactly the same, and use a strong flat seam to join.

After a while, patches on work trousers sometimes come undone from the corners. This can be avoided by either rounding the corners or stitching diagonally across them several times as in machine darning. The sides of very large patches could be incorporated in the leg seams.

Next time new working clothes are needed the men on the farm should try buying all-in-one overalls instead of trousers and shirts. One good type has a double-ended front zipper and heavy duty press-studs at neck, waist and sleeve. In winter a shirt or woollen can be worn underneath, protected from dirt, and in summer the overalls are much cooler than tucked in shirt and belted trousers. They are easier to launder (particularly in winter when drying can take a long time), also to mend, and there are no frequent requests for buttons to be sewn on. If the banded sleeve is not desired, cut sleeve short or remove at the armhole. Unpick band and seam and keep for patching.

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Chemical Poisoning IN ANIMALS

By H. D. SEDDON, B.V.Sc.

II.—LEAD

LEAD is the most frequent cause of poisoning in farm animals, especially of cattle. All animals and man are susceptible to large doses, but small repeated doses may accumulate to toxic proportions in the body. Cattle and sheep are more susceptible to poisoning and are more likely to have access to sources of lead.

SOURCES

The paint colouring compounds, of which lead is often the base, are one of its most important sources and include red lead, white lead and lead chromate. Red lead and sheet lead are also used extensively in the plumbing trade. Lead arsenate, a common insecticide used to spray fruit, is also capable of poisoning stock; but usually through its arsenic content rather than through the lead it contains.

Lead acetate, or sweet sugar of lead, is a common constituent of some animal liniments and lotions and is more dangerous due to its insolubility. Access to old tins or packages which have contained any of these compounds may lead to lead poisoning.

The accumulator plates and cases of discarded car batteries provide the most common source of metallic lead, and the depraved appetite often seen in young calves or in adult cattle suffering under the effects of phosphorus deficiency can lead to poisoning through eating these. Lead shot has also been the cause of poisoning in poultry and ducks. However, metallic lead is not quite as toxic as the more soluble lead salts.

ABSORPTION

Almost all instances of lead poisoning result from ingestion of the poison with feed or by access to discarded insecticide tins, battery plates, etc. It seems unlikely that poisoning could arise from lead shot or bullets which have lodged in the tissues. Cattle grazing phosphate deficient pasture take to chewing strange objects such as stones, bones and tins which are of no or little nutritional value, but may lead to poisoning.

Absorption from the alimentary tract is not great and most of the ingested lead is passed in the droppings. However, even the insoluble compounds are attacked by the digestive juices so that a proportion is rendered slightly soluble. Thus, the amount absorbed is much the same whether the form eaten is soluble (such as lead acetate) or insoluble (such as

metallic lead or lead carbonate). The amount absorbed is approximately 1 to 2 per cent. of that ingested. The rate at which absorption takes place, however, is higher with the more soluble forms.

Once absorbed, the lead is passed to the liver by the bloodstreams, where the majority is taken up and excreted into the gut with the bile. The small amount which passes on from the liver is excreted in urine, milk and saliva. Enough lead may be present in the milk of a poisoned cow to render it unfit for human consumption.

After continuous ingestion of small amounts of lead (i.e. **chronic poisoning**), most of it is found stored in bone, with smaller amounts in the liver and kidneys. With **acute poisoning** by ingestion of a lot of lead over a short period of time, less is found in the bones, and the majority is distributed in the liver and kidney.

Lead is retained in the organs a long time and abnormally high levels may be found in the blood and liver some months after eating a small dose. This can result in symptoms of poisoning after a number of small doses of lead over a period of time.

SYMPTOMS

Acute Poisoning.—The main and probably the only danger with sheep and cattle is acute poisoning—by the ingestion of a lot of lead in a short period of time. Symptoms are not seen for a few days but when they do appear, they are basically those of derangement of the nervous system.

In calves, bellowing, staggering, rolling of the eyes and frothing at the mouth are first seen. This progresses to intermittent periods of mania and convulsions, interspersed with quiet periods. During convulsions, the animal may appear quite blind and try to climb up or push against the walls of its stall or pen. Convulsive muscle spasms and champing of the jaws occur with increasing frequency to end in death, often as early as one hour from the onset of symptoms. Thus, perhaps the only signs seen are the dead calf or one taking a fit.

In less severe cases of acutely poisoned calves, dullness and loss of appetite occur over several days accompanied by signs of abdominal pain, such as groaning, an arched back, or licking and glancing at the flank. Constipation occurs, but this is often followed by diarrhoea and the calves slobber and tend to choke back.

Symptoms are less marked in adult cattle and are seen as salivation with slobbering, choking and lack of appetite followed by a drop in, or termination of, milk production in cows. There are intermittent attacks of abdominal pain with staggering and convulsions.

Dullness and loss of appetite are also seen in pigs and sheep, but sheep never show muscle spasms even in the terminal stages. In pigs, the droppings become grey-white to grey and may be blood tinged. They become frenzied, champ their jaws and may go blind. These symptoms lead to convulsions, coma and death. Mature pigs may not show convulsions, only an inco-ordination leading to paralysis and death.

Acute poisoning in horses shows less marked symptoms. There may be a depression, stupor and partial paralysis with knuckling over of the pastern-joints, but droppings are normal in colour and there may be no signs of colicky pain.

Dogs also show inconstant signs, with listlessness, loss of appetite and marked emaciation being most common. Muscle tremors, frothing at the mouth, vomiting and continuous barking precede any convulsions which may occur. These signs eventually terminate in blindness, coma and death.

Acutely poisoned poultry show depression, lack of appetite, emaciation with excessive thirst. Muscle weakness is seen with the wings drooping to the ground and the bird may be unable to stand. Droppings are often discoloured green. Young birds may die within 36 hours of ingestion of lead.

Chronic Poisoning.—This is the result of accumulation of lead in the body from repeated ingestion of small amounts of lead over a relatively long period of time. It rarely occurs in sheep and cattle as they are remarkably tolerant to small amounts of lead; it is however, often encountered in dogs and cats and was once frequent in horses. There is evidence that pregnant ewes are more susceptible, and continued ingestion may lead to abortion. Lead piping was a common source of contamination of water supplies, but it is

not used in modern water reticulation systems.

The principal signs of chronic poisoning are wasting with joint swellings, reduction or termination of lactation and abortion ending in convulsions and paralysis.

Horses suffering from chronic poisoning show a marked loss of weight, swellings at the carpal or "knee" joint of the forelegs and a gradual paralysis of the hind legs. There is a characteristic shortness of breath which may lead to "roaring" due to paralysis of the nerves supplying the vocal cords. In the horse, as with dogs, cumulative poisoning may occasionally produce a blue-black discoloration of the gums similar to the classical "lead line" of lead poisoning in man. However, this is comparatively rare.

POST-MORTEM SIGNS

In the acute form of poisoning in all animals, there is inflammation of the lining of the stomach and small intestine with areas of ulceration. The intestinal wall may be covered with a grey or black film of lead sulphide, due to a chemical reaction between the lead and the intestinal contents.

The liver shows degenerative changes and has a soft putty-like consistency. In fresh carcasses, the kidneys are pale, with small blood spots on their surfaces. Similar blood spots may be seen on the outer and inner surfaces of the heart muscle, or in any part of the body. Poisoned poultry may show necrosis of the liver even after very small doses of lead.

In chronic lead poisoning, the body is very emaciated and there is a general lack of fat beneath the skin, along the omentum and around the kidneys. The internal organs, especially the kidney, are shrunken. The liver is pale and fibrotic and shows haemorrhages through its substance.

DIAGNOSIS

Diagnosis is based essentially on symptoms of convulsive or maniacal behaviour with confirmation of gastro-enteritis and other changes at post-mortem. History of ingestion or access to lead or lead compounds aids diagnosis, but often lead may be available from a forgotten or unknown source.

TREATMENT

There is usually a lapse of a few days between ingestion of the lead and exhibition of symptoms. Therefore, acute cases in farm animals are usually encountered at too late a stage for treatment to be of value. Veterinary assistance should be sought where it is available.

However, precipitation of the lead should be attempted by the use of chemical antidotes such as the proteins of egg and milk. Subsequent purging should be used to get rid of the lead remaining in the intestine. Epsom salts or Glauber's salts have a dual action in that they have both a precipating action, forming the insoluble lead sulphate, and a non-irritant purging action.

The dose of Epsom salts to be given varies with age and weight, but adult horses, sheep, goats and pigs should be given a quarter pound dissolved in approximately a pint of water, while adult cattle may be given up to a pound dissolved in a few pints. The dose rate of Glauber's salts is a little higher. These quantities should be reduced for young animals and those in poor condition.

In chronic poisoning, calcium supplements should be given to hasten the deposition of lead in the bones from soft tissue, so that the danger of its accumulation to toxic proportions is reduced. These may be administered in the form of ground limestone or bone meal at a level of 1 to 2 ounces daily. Injections of calcium borogluconate subcutaneously at a rate of 50 cc of solution per 100 lb. liveweight may be used instead of or supplementary to this form of treatment.

PREVENTION

Prevention is basically a matter of common sense and care. Calves should be kept penned away from surfaces where lead containing paints have been applied. Containers which have held lead compounds, as well as old batteries and sheet lead should be disposed of in a safe place. The soluble lead compounds—especially the sweet sugar of lead—should be kept in places which are inaccessible to all animals and children.

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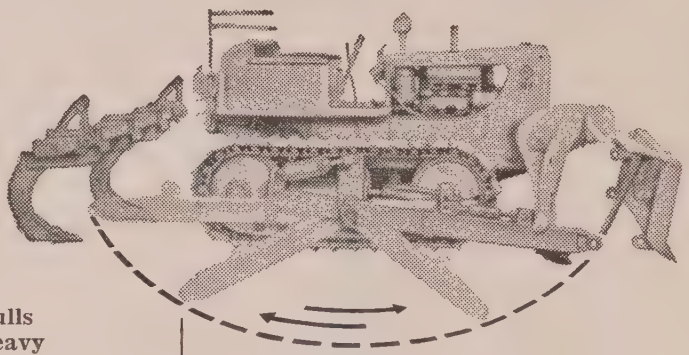

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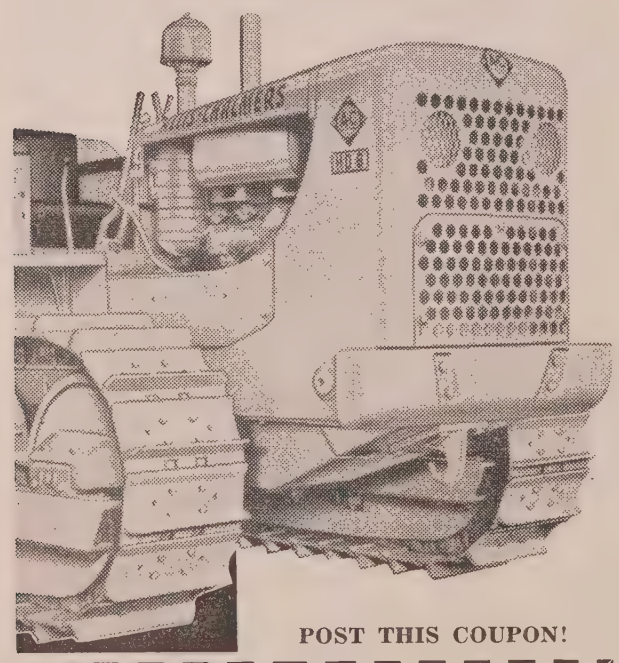

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STOCKING RATE AND PASTURE MANAGEMENT

By B. F. CARLIN, B.Sc. (Agric.), Agricultural Adviser

FARMERS west of the Great Southern Railway, raising sheep and beef cattle, frequently associate soil deficiencies with difficulties in holding sub. clover in their pastures. Field observations and some trials in those districts indicate that in many paddocks the problem arises through undergrazing rather than a deficiency in the soil.

The area under discussion is exemplified by the road districts of Wandering, Marradong, Williams, West Arthur, Kojonup, Upper Blackwood, Tambellup, Cranbrook and Plantagenet. Average rainfall is over 20 inches a year and rises in the south and west to 30 inches or a little more. Most of it grew red gum (*Eucalyptus calophylla*), white gum (*E. redunca*), or jarrah (*E. marginata*) associations in its virgin state. This is a mixed farming area, and in 1960 these districts carried 2,375,000 sheep and 45,000 beef cattle. Much of the area is still forest.

Stock graze on improved pastures based on Dwalganup, Yarloop, Woogenellup and Mt. Barker varieties of subterranean clover. Common stocking rates are the equivalent of one to two dry sheep to the acre. A reliable winter growing season of six to eight months is experienced with an annual summer drought.

DEVELOPMENT OF GRASS DOMINANCE

In this area sown pastures usually go through a phase of clover dominance in the early years of establishment. After the nitrogen in the soil has been built up, ripgut brome grass (*Bromus gussonii*), silver grass (*Vulpia myuros*) and other volunteer grasses commonly assume more importance in the pasture. Experimental work and farmer experience has shown that exclusion of stock soon leads to the disappearance of sub. clover from the mixture. Similarly, understocking can lead to grass dominance and eventually to the disappearance of sub. clover.

In the Kojonup, West Arthur, Upper Blackwood and neighbouring road districts, grass dominance and disappearance of sub. clover are common and are often attributed to soil deficiencies by farmers. During the spring of 1959 a number of such paddocks were inspected. They frequently showed rank stands of brome grasses and silver grass which are unattractive and unpalatable. In 1960, fertiliser trials were placed on some of these areas which had been reseeded with Woogenellup and Yarloop sub. clover. In most cases, healthy sub. clover grew over the whole area irrespective of fertiliser treatment.

FEEDING VALUE

Production from annual pastures at Kojonup gives something like two to three

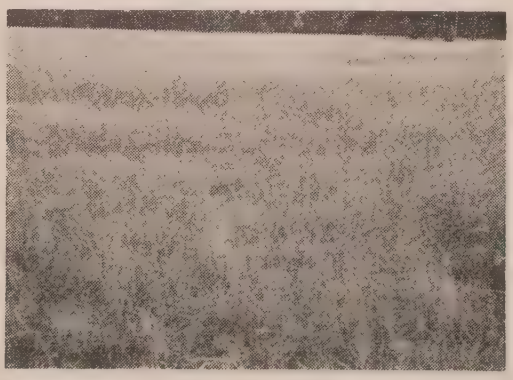

Fig. 1.—A poor quality grass dominant pasture on old land near Kojonup. Low stocking rates cause pastures to become grass dominant and once the sub. clover density is greatly reduced the pasture will only support a low stocking rate

Fig. 2.—A similar pasture to that in Fig. 1 has been converted to good summer feed by mowing the grass in the spring and leaving it in the paddock. This practice will help to reduce grass dominance

tons of dry matter an acre annually. Slightly lower production is to be expected northwards, and higher production in the west and south. Much of this material is at present wasted.

Understocked pastures become grass dominant and produce a bulk of unattractive low protein feed. In summer they are a hazard as far as grass seeds and fires are concerned. In these districts brome grass and silver grass mature slowly, with a steady decline in protein value down to 1.5% to 3%. At this stage the pasture is made up chiefly of ripgut brome grass, silver grass, capeweed (*Crypotstemma calendula*) and wild geranium (*Erodium spp.*)

EARLY WINTER GROWTH

When pastures degenerate in this way carrying capacity cannot be high. The position arises where pastures can only support a low stocking rate because they have been lightly stocked in the past. Most properties have some paddocks like this. They can be reclaimed only by reseeding with sub. clover and by better pasture management.

On the other hand a highly stocked pasture becomes stronger and more nutritious when stocked to capacity. Sheep do best on short feed, up to four inches long. A pasture which is well grazed presents short, high quality feed. The growing shoots of plants are high in protein and in minerals. Hard grazing prevents grass dominance and this promotes healthy clover growth. In turn, a strong stand of sub. clover fixes high levels of nitrogen which stimulate the grasses to strong winter growth.

Again, when the plant material of the hard grazed paddock dries off it is of higher quality for two reasons. Firstly, it has a higher proportion of sub. clover, which gives high quality dry feed. Secondly, because the grasses have been prevented from running up to rank, long growth, they constitute higher protein dry feed.

With a combination of dense plant residue at the beginning of winter and the absence of sub. clover, nitrogen deficiency becomes acute. The microorganisms breaking down the dead grass compete strongly with the young grass for available nitrogen. This, coupled with the normal slowing down of nitrogen release with the onset of cold weather prevents the establishment of a productive stand of grass and the pasture lacks vigour. However, many such unproductive pastures with a low proportion of sub. clover are topdressed with valuable fertiliser every year.

Fig. 3.—Merino ewes being mated on a mown pasture, Kojonup, December, 1960

HIGHER RATES OF STOCKING

Preliminary results of rate of stocking trials conducted at the C.S.I.R.O. Field Station, "Glen Lossie," Kojonup have evoked considerable interest (Lloyd Davies unpublished material). Wethers are being run in small paddocks from one to five to the acre without supplementation and on a set stocking basis. Ewes and weaners are also under trial at stocking rates of up to five to the acre. When available,

Fig. 4.—315 Merino wethers set-stocked on a 90 acre paddock at C.S.I.R.O. Field Station, "Glen Lossie," Kojonup, late December, 1960

the final results of these trials will be of great interest.

In a pasture trial at Glen Lossie to investigate the potential of a number of annual grass species with sub. clover, paddocks have been set stocked at three wethers to the acre since 1955 (Rossiter unpublished material). These pastures produced more than 40 lb. of wool an acre and maintained a high producing balanced pasture in an area where it is common practice to grow 15 to 25 lb. wool an acre on pastures which are generally grass dominant.

In rate of stocking trials in progress at Bengworden in East Gippsland, Victoria, pastures stocked with two wethers to the acre produced 27.5 lb. of wool to the acre whereas those stocked at the rate of four wethers produced 49 lb. per acre. It has been noted that the pasture carrying two sheep to the acre has become much grassier than that carrying four sheep to the acre and has more of the less desirable species and less clover. The four sheep to the acre pasture had a higher proportion of clover, was uniformly grazed and was, in general, a better pasture. The average rainfall at Bengworden is 24 inches and the average for each month of the year is fairly constant, although periods of up to six months of droughty conditions are experienced from time to time.

It would seem that local trials and observations in the field will confirm experimental evidence from Victoria and elsewhere that heavily stocked pastures carry more stock because they are heavily stocked.

On the Esperance Plains Research Station the first pasture was established ten years ago. At present the property is carrying three dry sheep equivalents to the acre comfortably.

There seems to be no reason why country west of the Great Southern, in the areas mentioned, should be inferior from a grazing point of view to scrub plain country with an 18 inch rainfall 20 miles north of Esperance. Some farmers between Boyup Brook and Kojonup are carrying three or more dry sheep equivalents to the acre and producing over 30 lb. of wool an acre. However, these are the exception rather than the rule. From Noggerup to Kojonup most properties would be carrying between one and two dry sheep equivalents to the acre.

Farmers commonly remark on the high carrying capacity of paddocks near the homestead. It is suggested that this is so because of better pasture management and utilisation under high stocking rates.

BETTER MANAGEMENT

It is difficult to change from one system of management to another in one stroke. Problems are involved in relation to the pasture and the stock.

Where the sub. clover has disappeared it will be necessary to re-seed with sub. clover. Woogenellup and Yarloop are suitable varieties for most of this area and provide vigorous growth during the winter. Reseeding old paddocks will probably necessitate spraying with Malathion and DDT to protect seedlings from red legged earth mite and lucerne flea.

Fig. 5.—Another view of the paddock shown in Fig. 4. This paddock is set-stocked at 3½ wethers to the acre and carried this cover late in December, 1960

Mowing pastures can be used as a pasture management tool to cut down grass dominance (Davenport). Best results will accrue from mowing and leaving in the spring the sections of the property carrying most grass. This will provide material which is much more readily utilised by stock and gives a higher proportion of clover in the pasture the following year. If left to dry off normally, these very grassy areas will be of little use as summer feed.

In actually increasing stock numbers retention of more wethers and beef cattle is suggested. Wethers can be used more readily than ewes for high stocking rates. If some areas become clover dominant, they can be used with reasonable safety by wethers. Set stocking one quarter or one third of the grazing area each year, from shearing to shearing, with three or four wethers to the acre will raise wool production and help maintain better pastures.

It is only reasonable that ewes cannot be run at the same grazing intensity as wethers. It will also be argued that higher stocking rates will increase the proportion of sub. clover and render ewes more liable to clover infertility. This may be true to a certain extent but many pastures have a long way to go to reach this position.

Farmers are urged to review the condition of their pastures and critically reconsider their rate of stocking. It appears that large areas in our most favoured districts are grossly understocked. This is resulting in the degeneration of high producing annual pastures. How many acres of grassy low protein pasture do you topdress each year on your property?

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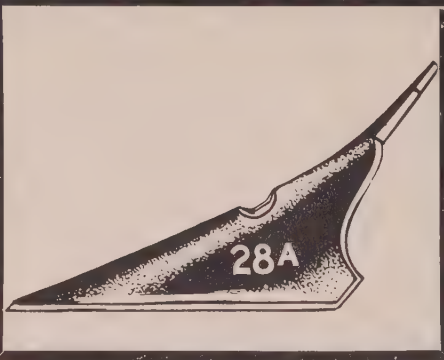
			Quality	Quantity		
One-sided Bottlebrush	*Calothamnus quadrifidus* R. Br.	Widespread in sand-plain areas	Poor	Good	Very good	Very poor honey ; useful to keep bees alive or to keep them breeding.
Prickly Dryandra	*Dryandra armata* R. Br.	Gravel soil and sheet laterites ; Midlands to Great Southern	Medium	Good	Uncertain	This plant is not well known, although it is widespread throughout the farming area.
Kerosene Bush	*Dryandra ashbyi* B. L. Burtt	Dongara and northwards. Some south of Dongara in small patches	Good	Good	Good	A good flow after good opening rains. The flow usually begins a fortnight after the first heavy falls in May.
Fraser's Dryandra	*Dryandra fraseri* R. Br.	Gravel soils Coorow southwards to Great Southern	Good	Good	Good	This plant is very much like the Kerosene Bush of the north. Reported from Dandaragan to flower at the same time as *Dryandra ashbyi*.
White Bell	*Leucopogon conostephiodes* D. C.	Widespread	Dark, with strong caramel flavour	Good	Good	One of the best plants flowering at this time of year. Time of flowering is important in maintaining hives in early winter and keeping strength up for spring flows.
White Heath	*Leucopogon propinquus* B. Br.	Widespread	Poor	Good	Good	As above.
Mothers Bell	*Leucopogon concinnus* Benth	Widespread	Poor	Good	Good	As above.
	Leucopogon oxycedrus Sond.	Widespread	Dark purple red honey	Good	Good	As above.
	Leucopogon oldfieldii Benth	Coastal plain and north sand-plain	Poor	Good	Good	As above.
Templetonia or Cockies Tongue	*Templetonia retusa* (Vent.) R. Br.	Coastal sands and limestone hills	Good	Fair	Good	When weather is mild, this flow builds up the bees.
Wild Radish	*Raphanus raphanistrum* Linn.	Widespread weed	Good	Good	Good	Excellent plant to build up hives and in some districts provides a surplus of honey.
White Clematis	*Clematis pubescens* Hueg.	Creeper; widespread	Unknown	Small	Good	Important for pollen flow.
White Bush, Kangaroo Bush	*Hakea trifurcata* (Sm.) R. Br.	Widespread	Poor	Good	Good	Important pollen flow which builds up the bees for the Parrot Bush.

It will be seen from this list that information concerning many nectar-bearing plants is far from adequate. We would appreciate further information from beekeepers



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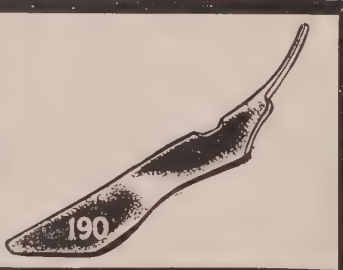

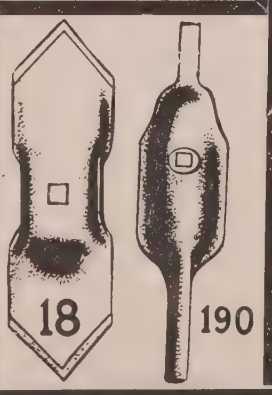

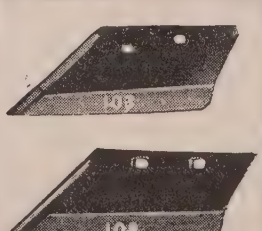

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SAVING LABOUR IN FEEDING CALVES

By R. BETTENAY, B.Sc. (Agric.), Agricultural Adviser, Dairying Division

PRESENT day values are such that no farmer can afford not to dispose of his calves to the best advantage. With the lighter breeds this might still mean vealing all bull calves within a week of birth, but with heavier breeds it is now more economical to keep all calves until they are at least six to eight months old.

Coupled with the rapid expansion of pasture area on many properties, this has resulted in many more calves being reared than ever before, and this at a time when farm labour is at a premium.

On many properties a considerable amount of time is being used to feed calves individually by the proven, yet time-consuming method of giving each calf its own set quantity of milk in a bucket, with or without the assistance of head bails. Other farmers are trying newer techniques, in an endeavour to save labour and yet produce a healthy well-grown calf.

Developments have taken place in two directions, the one being towards trough feeding and the other towards the use of rubber nipples to more nearly approach the natural action of the calf in sucking the cow. Nipples have the added advantage that calves will learn to suck much more readily thus saving time and temper.

The system of open trough feeding without nipples cannot be recommended as it results in calves consuming very different quantities of milk. The greedy, fast drinker will take much more than is good for it with resultant digestive upsets, whilst the shy feeder will get much less than it requires for optimum growth.

"Calfeteria" is the name given to a system where seven nipples were placed through the lid of a ten gallon can and seven calves are fed at one time. The system appears reasonably satisfactory but considerable labour is still involved.

In other calf yards various modifications of a system are used where calves are nipple fed from individual buckets. In one case a board is nailed to a fence with the nipples protruding through the holes bored for the purpose. Buckets are then one side of the fence and calves on the other.

On another property using a similar system the farmer has built piping bails from a central race and a bucket and stall for each calf. This appears an ideal system from the point of view of the calf but perhaps does not save very much labour as compared to the more conventional method.

Observations have shown that, with any system of nipple feeding, it takes a young calf ten minutes, and older calves at least five minutes to drink one gallon of milk. This gives a clue to a method which combines labour saving with ensuring that all calves get about the right amount, neither too much or too little.

I refer to a combination of trough or group feeding, with the use of slow nipples, with the added precaution that calves are roughly grouped according to age.

One farmer has facilities for feeding over fifty calves at one time, from a trough subdivided into three sections and a total of sixty nipples protruding to either side of the trough through a board above the trough. When weaned the calves looked a very even lot and it was reported that no scouring had taken place at any time during the season.

On another property calves are let in twenty at a time to nipples attached direct to a two-inch pipe which is supplied from a forty-four gallon drum.

These are but two of the means used by enterprising farmers to take much of the labour out of calf feeding by combining the general principle of feeding a group from one bulk container with nipple feeding, which slows up the time taken by a calf to consume its ration, and so gives all calves a chance to get their share. The appearance of calves fed by these means is a good indication that the methods really work.

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Cheese — AS I KNOW IT

By E. W. H. MASLIN, M.D.D., Dairy Instructor, Department of Agriculture

IT is probable that cheese was made accidentally in the first instance, by the carrying of milk in the stomachs of animals, when the milk clotting enzymes of the stomach converted the liquid milk into a junket or a solid mass.

Though cheese was crudely made in the early centuries, it possessed much better keeping qualities than the original milk, and provided food for journeys. It was thus early recognised that cheese making is a convenient method of converting a considerable part of the constituents of milk into a product that will keep well, is less bulky as it contains much less water, is of high nutritive value, and is both palatable and readily digestible.

England, the home of many fine cheeses, practically all of which have geographical names, produced most of her cheese on the farm, until about 1850. Farmhouse cheesemaking continued to flourish until the last war, after which it steadily declined and the growth of systematic factory methods, brought about more standardised day to day production to the industry.

The practice of cheese-making embraces a systematic series of mechanical operations, which have been gradually developed by experience and observation. In its widest application, it includes the production and care of milk, the conversion of milk into cheese, and the care of the manufactured product until it is ready to be used as a food.

Of cheese in general, it is surprising how few people who really like it realise how many different cheeses are made in Australia; unfortunately not so many different kinds are made in Western Australia.

In brief, cheesemaking consists in clotting milk by rennet, cutting the resultant junket or curd into small pieces and driving some of the whey out from the pieces of curd by the combined effect of heating and acid development, the finished material being packed into a metal or wooden container which determines the shape of the finished cheese.

Very slight treatments will result in a soft, moist cheese of short keeping quality, and intensive application of heat, and acidity development will yield a hard, dry cheese that will keep for many months or even years. Thus we may consider ordinary junket, which is really a stillborn cheese, as one, and Parmeson cheese as the other extreme of a theoretically infinite number of varieties of cheese.

How to buy good cheese is a question that may well be asked.

The first thing to do is to go to a reliable storekeeper or retailer, or if possible to one that specialises in sales of various types of cheese.

In most of the large towns there will be found a shopkeeper who is sufficiently cheese minded to pride himself in his stock, and there one should find the best cheese. You can only learn about good cheese by tasting it, and there will be, no doubt, many trials and errors before you have arrived at the criterion you desire.

One last word about how to keep cheese.

Undoubtedly, the best way to look after cheese is to consume it quickly, but modern authorities on the subject offer the following advice, on its conservation.

It should be stored either in a covered plastic, china or glass dish with ventilation holes in the lid. Alternatively, it should be kept tightly wrapped in the film wrapping in which most cheese is packed today, or in greaseproof paper in a polythene bag.

It should be kept in a cool dry airy place at temperature around 50°-60°F. Refrigerator keeping is useful today for a short time only and the cheese should be removed from the refrigerator some time before eating so that its full flavour will be restored.

But the best advice I can offer, is to eat up quickly, and return to your shopkeeper for more.

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TOXIC ANNUALS IN HORTICULTURE

By R. D. ROYCE, Officer in Charge, Botanical Branch

THE number of poisonous shrubs and trees that are grown in gardens is very great, and several of these species have been discussed in detail. It is probable that few people realise just how many of the commonest garden plants are in some way or under some circumstances, likely to contain a toxic principle. Furthermore, this is not confined to the longer lived plants, but it applies equally to the annual plants, both summer growing and winter growing.

The daffodil, a plant which is so prized by so many garden lovers is a case in point. The bulbs of this plant are known to contain a fairly high proportion of the alkaloid narcissine, and stock have been lost after grazing in abandoned gardens in which daffodils were growing. Pigs of course are particularly susceptible, because of their habit of rooting up bulbs, corms, etc. from the soil.

This does not necessarily make it an objectionable garden plant. Unfortunately however, there is also an irritant substance in the sap and this can cause skin trouble in susceptible persons. Cases have been reported among local nurserymen who specialise in daffodils, in which continual contact with the slimy sap from the cut flowers has caused very severe dermatitis.

Many related plants, such as Crinum, Jonquil and the Wilcannia Lily are also toxic. Amaryllis, like the daffodil, can cause skin irritation in man, and in addition the common Easter Lily possesses a heavy and nauseating scent. A case is on record in this State of a car accident on a country road caused by the drowsiness of the driver who was affected by the scent from a bunch of these lillies in the back of the car.

It is a well known fact that Shirley poppies contain a high percentage of a poisonous substance, and largely for this reason are not widely grown. The Iceland poppy on the other hand is a very popular winter flower, yet this is almost as toxic. It is interesting to note that bees are exceedingly fond of the pollen from these plants, but become very excited when gathering it. Despite the fact that they are not usually destructive in their gathering habits, bees have been observed pulling open the poppy buds in the early morning sunshine to get at the pollen before the flowers open. Chemical analysis has shown that opium is present in the pollen and this undoubtedly is the cause of the bees' excitement, and the reported damage to the hive supposedly associated with the Iceland poppy pollen.

The ever popular Primula is stated to cause severe dermatitis in an estimated 6% of people who come in contact with it. Actually a surprisingly large number of plants are capable of causing skin irritation including the common Nasturtium, Snow-on-the-Mountain and the garden Celery. The reddish-brown flowered creeper *Tecoma radicans* is not only capable of causing dematitis, but is also suspected of inducing symptoms of asthma.

Many garden forms of the Chili and its relatives are grown as annuals, and the bright red or variegated berries are a very attractive addition to the garden. When green however, these fruits are quite toxic, and many of the fully matured and coloured berries are also poisonous. These plants could be responsible for sickness in young children who are so apt to chew or suck bright objects. They should not be planted near the edges of gardens where they are accessible, but towards the back. The species concerned are the Bitter Sweet, Kangaroo Apple and Madeira Winter Cherry as well as the Chili.

For the greater part the species mentioned here are of immediate concern to human beings. These and many other plants are a potential danger to stock too, particularly in country districts.

Strawberry Growing

By K. T. WHITELY, B.Sc. (Agric.), Horticulture Adviser

ALTHOUGH the growing of strawberries is a venture that appeals to many backyard growers it is also a means of getting good returns off a relatively small area of suitable land.

The ideal soil for growing strawberries has a good topsoil rich in humus and a retentive but well drained subsoil. Most commercial growers use a peaty type soil but when this is not available suitable fertility can be built up by applications of heavy dressings of organic and artificial manures. The peaty soil has an advantage in that it is often summer moist and the task of watering is reduced considerably if not entirely eliminated.

As far as is known, most plantings in this State are infected with crinkle virus diseases, and these are a major cause of poor growth and yields. Varieties vary in their tolerance to virus, but all breakdown eventually as none are actually resistant.

The variety Climax is a virus tolerant type and is one solution to the problem of what variety to plant. The foliage is erect and vigorous and it gives good protection to the fruit which are large and well formed and of good flavour. Other varieties which yield well and are popular with the consumer are Melba and Pride of the West. The Queensland variety Phenomenal is showing good promise at Carnarvon and may provide an early maturing variety for that area.

Preparation of the land before planting is most important and must be thorough. All persistent weeds should be eradicated. If bulky organic matter is to be applied to the soil it should be evenly spread and a deep ploughing should follow, avoid as much as possible bringing clay to the surface.

Where possible virgin land should be used as there is less likelihood of pests and diseases and weeds are usually less troublesome.

An initial dressing of fertiliser should also be applied before planting and the aim should be to place this material just below the root zone of the newly set plants. Some three-quarters of the dressing of fertiliser decided on should be applied 2-3 weeks before planting and the balance as a topdressing later. The fertiliser rate will depend of course on the fertility of the soil which in turn is often related to previous crops grown in the soil. However, the following quantities have given satisfactory results and will give some criterion:—

(1) Animal manures at approximately 10 tons/acre.

(2) Blood and bone at approximately 1 ton/acre.

(3) A 1:2:1 mixture of sulphate of ammonia, superphosphate and potash at 12:15 cwt./acre.

Planting time varies with the locality and the variety but in reasonably frost free areas April and May are usually considered the best, on peaty soils August planting seems to give better results than putting the young plants in earlier.

For spacing a good working distance is from 2′ to 2′6″ between rows and 12″ to 15″ between plants.

Planting is most easily done with a small trowel. Long roots are trimmed and the old leaves cut back to leave three centre leaves. In planting the crown of the plant should not be set below ground level but just above it to allow for subsidence. The earth is pressed firmly around the base and the plant given a light watering to settle it in.

When the plants have set their first blossoms they should be given a top dressing of fertiliser as previously suggested, and then mulched with say, straw. The latter protects the berries, keeps down the dust during picking and conserves moisture. Good results have been obtained in some States by mulching with black polythene sheeting at planting but little experience of this technique is reported locally.

The main strawberry crop ripens from August to December with a peak about October-November.

It is important that the berries be dry when picked also the berries should be picked, with some stalk attached, in the cool parts of the day.

The most common leaf disease encountered is Leaf Spot which causes leaf spotting and frequently the death of leaves. It is controlled by Bordeaux or Zineb sprays.

Thrips may cause damage during blossoming but spraying with emulsion type DDT at blossoming gives good control.

It can be seen then that some care and management is necessary for the proper growing of strawberries but you can be assured that such care will surely reflect itself in the crops produced and subsequently in returns.

In closing I would say that at the present time there seems room for increased production of strawberries in this State. However, a ready source of good planting material and lower production costs are most important.

Potassium Deficiency In The Wheatbelt

By M. D. CARROLL B.Sc. (Agric.)

WHILST the application of potash fertilisers has become an accepted practice on many dairy farms in the South-West of this State, it is a practice with which most wheatbelt farmers are unfamiliar.

Yet in recent years there has been an increasing number of reports of potassium deficiency occurring on soils in the drier agricultural areas, and the suggestion has been made that farmers in these areas will also need to use potash fertilisers to overcome this deficiency.

Why is it, that, in the past, dairy farmers have been forced to use an expensive fertiliser whilst wheatbelt farmers, on similar soil types, have not? There are probably two main reasons. Firstly, under the higher rainfall condition of the south-west, leaching rapidly occurs and potassium released from the soil organic matter by cultivation is soon washed below the root zone. This process is much slower under the drier conditions of the wheatbelt. Secondly, farming in the dairy areas tends to be more intensive and considerable quantities of potassium leave the farm in the form of milk, meat and hay. On the wheat and sheep farm, the quantity of potash removed per acre in cereal grain and wool and meat, at low stocking rates, is much less.

Why has potassium deficiency in the wheat-belt only recently come to our attention? The answer to this question lies mainly in the current large scale development of light land in the wetter regions of the cereal districts, for it is mainly in the deep sands and leached sands overlying clay, which occur in these areas, that potassium deficiency has shown up.

The symptoms of potassium deficiency in subclover consist of a brown flecking of the leaves, followed by burning and rolling of

the leaf margins and eventually death. These symptoms closely resemble the appearance of pasture dying off at the end of the season, and since these symptoms often do not show up until the spring flush, the two are easily confused. This may be another reason why potassium deficiency has previously escaped our attention.

We know now that potassium deficiency does occur on subclover established on some of the light soils in the cereal districts, and that increases in growth have frequently been obtained by using potash fertilisers. Field trials have shown responses at Gardner River, Jerramungup, Borden, Woodanilling, Narrogin, Bulyee, Quairading, Wongan Hills, Wannamal, Watheroo, and Eneabba.

These trials have shown that an application of at least 56 lbs of muriate of potash per acre is generally required to overcome the deficiency in subclover and responses have been obtained up to 4 cwts/ac.

At approximately £32 per ton, muriate of potash is a relatively expensive fertiliser and the farmer faced with an area of potassium deficient soil should consider a number of factors before deciding the question—will it pay to use potash on my farm?

Firstly, subclover is unlikely to show much increase in growth until the spring which means that there is little increase in vital winter production. Secondly, experiments have shown that although deficiency symptoms have been cured by potash application, the increase in pasture growth has often been negligible. Thirdly, growth increases obtained in one year have not been repeated every year. In a dry season with an early finish there may be no benefit at all.

However, it may not be necessary to apply potash every year. Under the lighter rainfall conditions of the wheat-belt some residual benefit can be expected, especially on deficient areas with a clay subsoil.

Whilst cereals and grasses are unlikely to show any direct benefit from potash application, a marked increase in the growth of subclover will lead to a build up of soil nitrogen which will stimulate the grass component of the pasture and benefit the following cereal crop.

To sum up: There are potassium deficient soils spread over a wide area of the wheat-belt. The question of treating these soils, however, is a complex one and each case must be treated individually. Soil type, rainfall, previous history, type of production, length of rotation, intensity of stocking will all have an important bearing on this problem.

SOWING CEREALS ON CLOVER LEY

By H. M. FISHER, B.Sc. (Agric.),
Wheat and Sheep Division

WITHIN the next two to three months about 5½ million acres of cereals will be sown for grain in this State. A proportion of the crop will be on clover ley land where, as many farmers are finding, excellent yields are to be expected. High yielding crops are amongst other things, the reward of thorough preparation and careful attention to the seeding operation. However, while most people appreciate that poor planting is inevitably reflected in final yield it will nevertheless not be economic to extend effort to a level from which there will be no proportionate return. In brief the aim is to achieve maximum result with minimum effort.

A good deal of attention has been given to these questions in recent years resulting firstly in the realisation that little benefit is to be gained by fallowing clover ley land even in the drier parts of the clover ley areas.

In cropping non-fallow clover land weed control assumes much more importance for three reasons. Firstly weeds receive no check in the year before cropping; secondly they grow more vigorously as fertility increases, and therefore are more difficult to handle; thirdly, the pasture grasses in particular are known to be involved to some extent in harbouring certain pests and diseases. It is important then to control weeds as efficiently and completely as possible. Trials have demonstrated that ploughing 3-4 inches deep with a mouldboard or disc plough is far more effective than using a scarifier. To get the greatest

benefit from a single ploughing the operation should be delayed until a good weed germination occurs—ploughing too soon after opening rains often means a number of extra cultivations for the desired effect. If ploughing is well done at the right time a minimum of cultivation is necessary before seeding.

More recent trials indicate that the necessity for further cultivation depends on the efficiency of the seeding machine itself with respect to final weed control in the seedbed. Few machines in general use are entirely competent in this regard. Generally speaking the combination of disc harrows, pulled before a combine, appears to produce better results than the combine alone.

For various reasons sowing immediately after initial ploughing is not desirable with wheat or barley. Among other things such a practice predisposes the crop to disease and pest attack. If the land is left for at least a week the severity of attack will be decreased and, on our evidence, better yields obtained. In carrying out the seeding programme therefore it would be best to consider sowing oats first, as oats resist the attack of many of these organisms. Barley could be sown next, leaving wheat as the final sowing on areas which have been left bare the longest.

The seed used should of course be the correct variety for the area and month of sowing. Recommendations are available in the Department of Agriculture Journal on this aspect. Graded plump seed treated or "pickled" with appropriate fungicidal preparations should be used, and the seed should be sown at a depth of not more than two inches. On well prepared land a high seeding rate is not necessary. Our trials indicate that 40-45 lb./acre is sufficient for all cereals. It should be pointed out however that if land preparation is not quite up to scratch higher rates than 40-45 lb./acre improve yields, although the improvement does not compensate for lack of preparation.

Going back briefly over the points mentioned it is maintained that, overall, clover ley land produces more if fallowing is eliminated. Without fallow yield can be maintained but more thorough methods for weed control are necessary. It is evident that ploughing following weed germination achieves this more surely than scarifying.

Little further cultivation is necessary if the seeding operation is effective, and the use of the disc harrow-combine unit appears generally satisfactory in this regard. For wheat and barley, seeding should be delayed at least a week after cultivation. Good quality seed of the correct variety should be sown at 40-45 lb./acre at a depth of not more than two inches.

ROCK PHOSPHATE AS A FERTILISER

By E. N. FITZPATRICK, Research Officer, Plant Research Division

FOR many years both farmers and research workers have been interested in the use of rock phosphate as an alternative phosphate fertiliser to superphosphate. The appeal of rock phosphate lies in three points. Firstly, it has a higher phosphate content, secondly there is the hope that it will have a greater residual benefit than super, which is more liable to leaching and supposedly more likely to be tied up in some unavailable form in the soil, and thirdly rock phosphate costs less per ton.

The disadvantages of rock phosphate are, firstly that the phosphate in it is not as available to plants as that in superphosphate and secondly that it contains no sulphur. The problem of the farmer and research worker is to weigh up the advantages and disadvantages of rock phosphate for particular conditions and to look at ways of overcoming the disadvantages. The existence of sulphur deficiency could limit rock phosphate use in this State. Due to the almost universal use of super which is half calcium sulphate, or as it is more commonly known gypsum, we do not know how widespread sulphur deficiency is on virgin soils; although we do know that it does occur.

The insolubility of rock phosphate could be partly overcome by very fine

grinding. Experimental work has shown that plant growth is improved by finer grinding. However the cost involved and the practical problems of topdressing or drilling a material as fine as talc rules this out as a solution to the problem. As a result rock phosphate ground as for super manufacture is being used in most of the experimental work at present in progress.

In experiments, rock phosphate has given various results under a wide range of conditions.

With subterranean clover sown on new land it has usually been unsatisfactory. In general, it appears that it is necessary to apply four times as much phosphate in the form of rock phosphate as phosphate in the form of super to obtain similar growth. There is however one exception to this overall picture. On a group of acid peaty sands, which are found along the west coast as far north as Gingin and on the south coast as far east as Albany, rock phosphate has given growth equal or better than that obtained with superphosphate, in the early years of establishment. These results have been obtained only where the limestone which is needed for legume establishment on these soils is dug into the surface 4 or 5 inches and not left on the surface. However, on this group of soils, sulphur deficiency is likely to occur requiring either separate gypsum applications or the use of superphosphate.

On older land to which super has been applied for a number of years, results with rock phosphate have been more encouraging but it has never been equal to superphosphate when compared at equal rates of phosphate application on subterranean clover pastures. The difference in favour of super tends to be greatest in winter and to disappear in spring, so that the overall effect on carrying capacity could be greater than is shown by simple estimates of overall growth.

However, most of the work has only been in progress for four or five years and the picture could alter over a longer period. Also only limited work has been carried out with mixtures of super and rock phosphate. Possibly such mixtures will give growth equal to superphosphate and at the same time supply more phosphate per acre for the same price.

Traditionally lupins have a greater ability to use rock phosphate than subterranean clover. However variable results have been obtained in this State. At Eneabba and Dandaragan, rock phosphate has given satisfactory growth of lupins, but at Coorow this has not been the case.

In general, we must conclude that on present knowledge superphosphate is a much better form of phosphate than rock phosphate. Research results may change this picture in the future but until then farmers would be well advised to discuss their particular problem with an Agricultural Adviser before using rock phosphate on any extensive scale.

DIE-BACK IN FLOOD GUMS

By C. F. H. JENKINS, M.A., Government Entomologist

THE flood gum, sometimes known locally as the blue-gum, is one of our most attractive eucalyptus species. It grows mainly in low-lying or flooded areas and lines the banks of our South-West rivers and streams. Over a period of years however, this beautiful tree has declined alarmingly in many districts and landholders from the Avon Valley to the Blackwood have expressed their concern. One of the first districts to show die-back in these trees was the Harvey-Waroona irrigation areas and a change in the water table was suggested as the primary cause. In more recent years however, the trouble has been noticed far from the original centre and is causing increased concern.

The fact that dying trees are heavily infested with various types of insects does not necessarily mean that the insects are the primary cause of trouble. It must be remembered that the flood gum is a native tree, and that it has been subjected to the attacks of native insects for generations. If therefore, the insects are now killing the trees, something must have

upset the natural balance. The change in water level and land use in the irrigation areas could have been a contributing factor, and general clearing in other districts may also have had its effects.

Amongst the commonest insects to be found on flood gums, are the lerp insects or psyllids. These tiny sap-sucking creatures hide under a sugary covering or scale, and individual leaves may be smothered with these parasites. Many different species of psyllids affect our native trees, but generally speaking they are kept in check by wasp parasites and other natural enemies. Birds play an important role in controlling forest pests, and the decline in bird numbers, caused by clearing and agricultural development, could have an important bearing on the present problem.

Tiny leaf-haunting birds, like the pardalotes and the tree-tits feed, largely on the psyllids, but several parrots are known to help, including the King Parrot, and the lorrikeet. When we remember that the scale-like covering of many psyllids consists of a sweet sugary material once much prized by the aborigines, its acceptance by parrots is perhaps not really surprising.

Several caterpillars also attack the foliage and among the commonest is the jarrah leaf miner. As the name suggests this insect is primarily a pest of jarrahs, and the tiny caterpillars tunnel in the leaf tissue. When full-fed, the creatures web together the upper and lower leaf surfaces to form a tiny oval cocoon, which then falls to the ground. Heavily attacked foliage may be peppered with holes, and in the distance the leaves often look just as if they have been scorched.

Sometimes the lerp insects appear to be the main destroyers and at other times the leaf miners predominate, but when heavy infestations of both coincide the results may be quite alarming. It is fortunate that in the case of the leaf miner only one generation occurs each year so that although the winter and spring foliage is often severely blemished the new summer growth is unharmed.

For a number of years now the flood gums in various parts of the South-West have been closely watched in an effort to understand the variations in health which occur from district to district and from season to season. Comparable insects can be found on eucalypts hundreds of miles apart and yet in one spot the trees may be thriving while in another they may be almost dead. As stated earlier the problem is a complex one and is probably associated with some overall change in the environment. Some farmers have asked for spray treatments to protect their trees, while others have advocated wholesale aerial applications to deal with the matter. Unfortunately however, any benefits derived from such action would probably be very brief, and certainly very expensive. The insects may be the immediate cause of the trouble but their increase is associated with some less obvious but more fundamental factor, and only when this has been explained is a practical solution to the problem likely to be found.

POWER TAKE-OFF CAPACITY

A number of instances of difficulties with P.T.O. drives have been brought to the notice of the technical staff of the Tractor Testing Committee in recent months.

Mr. G. H. Vasey, Officer-in-Charge, Tractor Testing, of the University of Melbourne, reporting on this to the Tractor Testing Committee, explained that two sorts of troubles seemed to be involved.

First, some P.T.O. drives have not been designed to transmit the full power of the engine at rated speed, and second, in others where the P.T.O. is through a separately lubricated box or unit, the lubrication is not designed for continuous operation.

Such applications as pumping for spray irrigation put the P.T.O. under high and continuous loading of a sort quite different from that of functioning a towed machine, for which most P.T.O.'s were apparently designed.

Mr. Vasey pointed out that the Australian tractor test already included a one hour run at full load on the P.T.O. with the engine at the speed required to give British Standard Speed of 540 rpm on the P.T.O. shaft.

Before setting up drives from the P.T.O. to these heavy continuous loads, users should obtain from the tractor manufacturer advice on the maximum permitted rating of the P.T.O. under continuous loading.

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UTILISING STRYCHNINE

IN THE PREPARATION OF

DINGO AND FOX BAITS

By L. A. HARRISON, M.D.A., Research Technician, Agriculture Protection Board.

AT present dingo and fox baits are made from fat or other material attractive to the animal to be poisoned, into which is inserted either alkaloid or soluble strychnine.

The strychnine used in the past suffers from several disadvantages—the greatest of which is the bitter taste—some of which invariably finds its way on to the outside of the bait. Besides the two chemical forms of strychnine mentioned above the poison also comes in three mechanically different forms. These are:—

(a) Crystalline.
(b) Powder.
(c) Tablets.

It is extremely difficult when making small baits with either (a) or (b) to prevent poison contaminating the outside of the bait material being handled. It only takes a slight puff of wind or an unsteady hand to result in the poison, with its accompanying bitter taste, being spread over the outside of the baits.

Another difficulty in using crystalline or powdered strychnine in the field is the problem of accurately metering out a measured dose of the poison. It is often claimed that a large overdose sometimes results in the animal regurgitating the bait, whereas too little could educate the animal against future baiting.

With the tablets the problem is not quite so acute but it is often found that after handling several of these that a slight amount of powder adheres to the person's hands or to the tray on which the baits are being made. In consequence, as a fresh bait is handled, some of this attendant bitter powder is transferred. (With tablets there is no problem in measuring the quantity as they are prepared and sold as ½-gr. tablets.)

It was with this background of unsatisfactory preparation of strychnine baits that it was decided to investigate the use of a stable suspension of the poison in a thick gelatinous carrier. Several such carriers came under review, namely, gelatine, alginates and methyl cellulose.

It was decided that the physical properties of the methyl cellulose were what was required for this preparation. The biggest factor in favour of the methyl cellulose was its increased resistance to bacterial breakdown.

Gels of varying strength were prepared to see if a stable suspension could be achieved. It was found that a concentration of 2 per cent. had the two desired characteristics, viz.:

(a) The concentration was suitable for suspending powdered alkaloid strychnine in the required dose.
(b) It was of such consistency as would pass through a heavy gauge hypodermic needle.

A stock suspension was made in which half of a grain of alkaloid strychnine was dispersed evenly throughout each one quarter c.c. of the 2 per cent. gel.

It is then an easy matter for a person using this material to pump ¼ of a c.c. into each bait, safe in the knowledge that it contains a measured amount of strychnine sufficient to kill the average dingo, wild dog or fox.

This preparation was first made to impregnate turtle eggs found near Port Hedland with strychnine as a fox bait. The idea was so attractive that it was then investigated as a method of making all types of strychnine dog and fox baits.

Another possibility was also explored, viz., the coating of the present strychnine tablet with a thin layer of methyl cellulose gelatine, which on exposure to air, hardens and forms a protective coating. This coating dries quite hard and without taste. Therefore, tablets treated in this manner could be handled without any fear of the taste of strychnine being transferred to the outside of the bait. However, it is recognised that this might possibly increase the hazards of strychnine tablets to human beings who may mistake them for other similar sized tablets, there being no accompanying bitter taste to act as a deterrent. Consequently the idea was not investigated any further.

In preparing a mixture suitable for poisoning meat baits etc., the following method needs no complex measuring or weighing devices—merely a half pint bottle or measure.

As many farmers have small hypo syringes, these will only need to be fitted with a large-bore bleeding needle to allow a free flow of the gelatine. (Methyl cellulose or "Cellofas" is available from the stock firms at approximately 10s. per lb.).

One sixth ounce of methyl cellulose is mixed into half a pint of cold water and allowed to stand for 10-12 hours to dissolve completely. Pour off half the gelatine in the half pint container and add the powdered alkaloid strychnine powder; stir thoroughly while adding the balance of the gelatine—discard any surplus. If the mixture has been thoroughly stirred each ¼ c.c. will now contain ½-grain of the powdered alkaloid poison—sufficient to poison one dingo or fox bait.

The mixture flows freely from the syringe and care is needed to see the baits are not overcharged with poison. Care should be taken to see that the mixture is kept in an airtight container.

If not exposed to the air, the mixture should keep indefinitely. However, if not kept in a sealed container the mixture will dry out and will not pass through the needle.

SUMMARY

(a) A 2 per cent. methyl cellulose gelatine was found suitable for the suspension for alkaloid strychnine powder for use in poisoning dingoes, wild dogs and foxes.

(b) This suspension was capable of administration through a large bore hypodermic needle.

(c) A suitable concentration for strychnine was worked out so that half a grain (sufficient to kill dingo, wild dog or fox) could be conveniently contained in ¼ of a c.c.

(d) Some thought was given to the coating of strychnine tablets with a non-tasting gelatine such as methyl cellulose which would harden on exposure to air. However it is considered that an added hazard to the public health might be created by such a practice.

(e) The method of preparation and use is described.